MODEL 1260A

PULSING TEST SET

INSTALLATION AND OPERATION

Northeast Electronics Instruction Manual
A1260-03-600 Issue 3A March 1984

northeast electronics
DIVISION OF tau-tron inc.
A UNIT OF GENERAL SIGNAL

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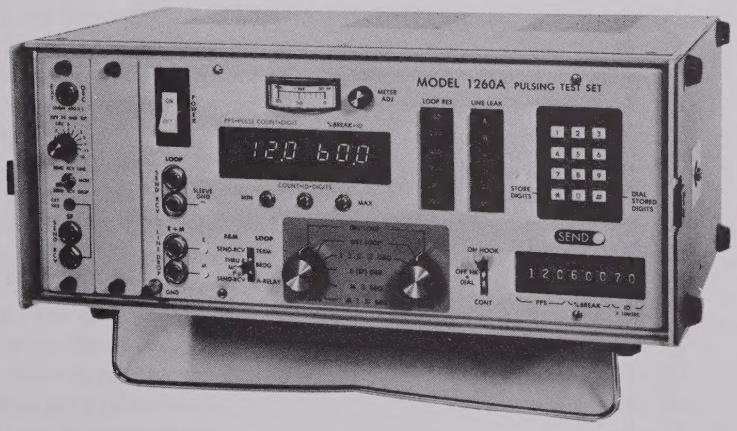

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SECTION 1

GENERAL DESCRIPTION

1.1 This manual describes the Northeast Electronics Model 1260A Pulsing Test Set. The test set is a precision digital instrument designed to send, receive, and measure pulsing in any of several loop, E&M and SF modes. The sending and receiving capabilities are fully independent so mixed modes can be used...for example, sending loop while receiving E&M, or vice versa.

1.2 The send section transmits continuous pulsing, or any number of dialed digits. Alternatively, a user-programmed number up to 16 digits long can be automatically dialed or redialed from memory. Digits are entered via a front panel keypad. Outpulsing speed, percent break, and interdigit time are precisely variable over wide limits to permit easy, but exact margin testing. Selectable loop resistance and line leak networks are built-in for convenient loop simulation and margining as needed.

1.3 The receive section precisely measures the speed, percent break, and interdigit time of received pulsing. No pre-measurement calibration is required. Measurement results are displayed on a digital readout.

1.4 The Model 1260A gives its user the following measurement data:

- ☐ Average speed and percent break over multiple pulses in a string (continuous pulsing or one or more dialed digits);
- ☐ Minimum speed and percent break for pulses in a string (slowest speed and lowest percent break);
- ☐ Maximum speed and percent break for pulses in a string (fastest speed and highest percent break);
- ☐ Total count of all pulses received for multiple pulses/digits in a string (up to a maximum of 999 pulses);
- ☐ Minimum interdigit time for digits in a string;
- ☐ Display of each individual digit received and the actual interdigit time following that digit (up to 16 digits maximum).

1.5 The 1260A measurement data helps reveal common signaling problems such as: (a) first pulse problems from A-relays; (b) split (double) pulsing and other erratic relay operations; (c) intermittent signaling conditions of other types.

1.6 A digital readout precisely displays measurement data. An analog meter is also included to show short term percent break variations and on-hook/off-hook status on the line. The analog meter indications are the same for all loop, E&M, and SF modes.

1.7 TYPICAL APPLICATIONS

1.8 The Model 1260A can pulse test both signaling and switching equipment. It has the capabilities needed for:

- ☐ Acceptance testing of new plant;
- ☐ Routine and margin testing of in-service plant;
- ☐ Trouble sectionalizing;
- ☐ Alignment/tune-up adjustments.

1.9 The 1260A simplifies the task of exercising circuits over their ranges of sectional and end-to-end signaling requirements. Margin tests for speed, percent break, interdigit time, leak impedance and loop resistance can all be performed using the 1260A's built-in features.

1.10 The 1260A is also suitable for pulse testing/tuning a variety of signaling and switching components such as:

- ☐ Registers and senders;
- ☐ Pulse repeaters;
- ☐ Pulse correctors;
- ☐ Loop to/from E&M converters;
- ☐ Switch train components . . . digit absorbing selectors, regular selectors, connectors, and related equipment.

1.11 The instrument's ability to display each received digit and the interdigit time for that digit is particularly useful in identifying problems associated with senders, repeaters, and similar equipment. And, the independent send and receive functions permit easy checks on the accuracy of many signaling converters. That is, exact input-to-output comparisons can be made on loop to E&M converters, loop to SF converters, and so forth.

1.12 Dynamic testing can be performed on A-relays under realistic conditions which closely approximate those existing in service.

1.13 The Model 1260A can make pulsing measurements under a wide variety of conditions. For example, the instrument will maintain full pulsing speed and percent break accuracy when making terminated measurements in the presence of contact suppression networks; up to 2 microfarads and 600 ohms. (This often eliminates the need for removing such networks.) Also, "live" pulsing can be monitored on in-service circuits by bridging the line.

1.14 TEST MODE SELECTION

1.15 The independent send and receive sections handle the following types of signaling arrangements:

- ☐ Dry loop;
- ☐ Wet loop, (battery and ground);
- ☐ E-lead ground and open pulsing (employed by E&M Types I, II, and III);
- ☐ E-lead ground battery pulsing;
- ☐ M-lead battery and open pulsing (employed by E&M Type II signaling);
- ☐ M-lead battery and ground pulsing (employed by E&M Types I and III);
- ☐ SF (2600 Hz).

1.16 For wet loop pulsing, the 1260A makes/breaks both sides of the line. This is an important factor in some applications. A convenient test A-relay in the 1260A is easily substituted for an in-circuit A-relay when required by loop testing practices.

1.17 For E&M testing at 6-wire patch bays or similar points, the 1260A's internal design makes it possible to easily select the proper conditions for sending/receiving in either the line or drop directions. Idle/busy status indicators and a reverse direction busy-out feature are also built-in for E&M testing.

1.18 SEND SECTION

1.19 The Model 1260A has a precision, crystal-controlled oscillator as the master reference for all outpulsing. Outpulsing speed is variable from 1 to 29.9 pps in 0.1-pps steps. Percent break is adjustable from 10 to 89.9 percent in 0.1-percent steps. And interdigit times from 10 to 990 milliseconds can be selected in 10-millisecond increments.

1.20 Selected speed and percent break values apply to all outpulsing . . . whether continuous pulsing or dialed digits. Selectable leak impedance networks (A, B, C, D, D1, SF1) and loop resistance (0 to 6300Ω, 100-Ω steps) can also be imposed on outpulsing in loop modes.

1.21 RECEIVE SECTION

1.22 The speed measurement of received pulsing has an accuracy of ±0.1 pps over a range from 4 to 29.9 pps. The percent break of received pulsing is measured with an accuracy of ±0.5 percent over a range of 10 to 89.9 percent. Interdigit time is measured over a range of 250 to 999 milliseconds with an accuracy of ±1 millisecond.

1.23 With continuous pulsing as the input, the average pulsing speed and percent break is automatically updated and displayed after each group of 10 pulses is received. When dialed digits are being measured, the average pulsing speed and percent break parameters are updated after each non-one digit is received. (Pulsing speed and percent break data is not available for dialed digits having a value of 1.)

1.24 Besides average pulsing speed and percent break, other measurement data is accumulated and displayed by the instrument as mentioned previously in paragraph 1.4. Any parameter can be measured on a bridging or terminated basis.

1.25 MECHANICAL

1.26 The Model 1260A is housed in a combination portable and rack-mount case. Rugged construction enables the instrument to stand up under hard-use conditions. Included as standard equipment are:

- ☐ A carrying handle for portable use;
- ☐ A tilt stand for table top operation;
- ☐ Brackets for mounting in 19-inch or 23-inch racks.

1.27 INPUT POWER (DC)

1.28 The 1260A operates from 48 Vdc office battery at 1 ampere maximum. Input power can be applied via either a type 310 jack or a rear panel barrier strip. The type 310 jack is generally the most convenient connector for portable operation, while the barrier strip is generally the most convenient connector for rack-mount operation.

1.29 AC POWER OPTION

1.30 An ac power option is available to permit operation from 115/230 Vac, 50 to 60 Hz power. The option is factory installed when ordered concurrently with the 1260A. Alternatively, the option can be purchased separately at any time for field installation in a standard 1260A.

1.31 SF MODULE OPTION

1.32 The optional send/receive SF module gives 2600-Hz SF signaling capability to the basic Model 1260A. It plugs into a slot located in the left portion of the instrument's front panel.

1.33 The SF module provides SF send levels and receive sensitivities appropriate for the line or drop direction of the test (i.e. they conform to standard 4-wire circuit TLP levels as shown in Table 4—6). In addition, a panel control permits deviation from the fixed send levels of Table 4—6 over an 18-dB range. This capability is useful for margin testing and applications where non-standard send levels are employed.

1.34 As shown in Table 2—3, the SF module sends and measures SF pulsing over a wide range and with high accuracy. Measurements can be made on a terminated basis or under in-service conditions by bridging the line. An indicator lamp is included to show idle/busy status.

1.35 Where required, the SF module can be internally set to send 2400-Hz SF signaling. In addition, an external oscillator jack permits use of external SF sources. The ability to receive SF tones other than 2600 Hz is also internally selectable.

SECTION 2

SPECIFICATIONS

2.1 Table 2—1 lists specifications for the standard Model 1260A Pulsing Test Set. Table 2—2 lists specifications for the ac power option and Table 2—3 lists specifications for the optional SF module.

Table 2—1. Model 1260A Pulsing Test Set Specifications

SEND SECTION

Speed

Range:	1.0 to 29.9 pps
Resolution:	0.1 pps
Accuracy:	±0.1 pps

% Break

Range:	10 to 89.9% break
Resolution:	0.1% break
Accuracy (Wet Loop):	±1.0% break
Accuracy (All other modes):	±0.5% break

Interdigit Time

Range:	10 to 990 msec
Resolution:	10.0 msec
Accuracy:	±1.0 msec

Loop Resistance

Range:	0 to 6.3 kΩ
Resolution:	100Ω
Accuracy:	±1.5%

Line Leak Networks: Standard types A, B, C, D, D1, and SF1

Pulsing Relay: Mercury-wetted, contacts internally fused at 1 ampere

Outpulsing

Continuous:	Continuous outpulsing at speed and % break set on thumbwheels.
Keypad:	Outpulsing of selected digits (0 through 9) at speed, % break, and interdigit time set on thumbwheels.
Memory:	Outpulsing of stored digit sequence up to 16 digits long at speed, % break, and interdigit time set on thumbwheels.

RECEIVE SECTION

Speed

Range:	4 to 29.9 pps
Accuracy:	±0.1 pps*

NOTE

Pulsing speed restricts the percent break range. See Figure 4—8 for clarification.

*Not measured in A-relay terminated or loop bridging modes.

Table 2—1. (Cont'd)

% Break	
Range:	10 to 89.9% break
Accuracy:	±0.5% break*
	NOTE Pulsing speed restricts the percent break range. See Figure 4—8 for clarification.
Speed, Percent Break Measurement Technique	
Dialed Digit Input:	Speed and percent break averaged over pulses in last non-one digit received.
Continuous Pulsing Input:	Speed and percent break averaged over last group of 10 pulses received.
Interdigit Time	
Range:	250 to 999 msec
Accuracy:	±1.0 msec
Over-Range Indication	Flashing "999" in ID time display
Pulse Count	
Range:	1 to 999 pulses
Over-Range Indication	Flashing "999" in pulse count display
Digit Memory	
Capacity:	16 digits
Display Method:	Recall and display of one digit at a time starting with first digit received.
Input Impedance	
Bridge or Monitor:	> 20 kΩ for both Loop and E&M
Termination:	400Ω for Loop; approximately 1.5 kΩ in series with zener diode for E&M
A-Relay:	Type 221A incoming selector relay calibrated per Table 4—5.
POWER INPUT	
CO Battery:	−42 to −56 Vdc at 1 ampere maximum
AC Power Option:	Nominal 117/234 Vac at 50 watts
OPERATING ENVIRONMENT	
Temperature:	0° to 50°C (32° to 122°F)
Relative Humidity:	0 to 75% non-condensing
DIMENSIONS	17 in w × 7½ in h × 13 in d (43.2 cm w × 19.1 cm h × 33.0 cm d) (Adapters supplied for mounting in 19 inch or 23 inch racks)
WEIGHT	14.0 lbs (6.4 kg)

*Not measured in A-relay terminated or loop bridging modes.

Table 2—2. AC Power Option Specifications

Voltage:	117 or 234 Vac ± 10%
Frequency:	50 to 60 Hz ± 3 Hz
Current:	0.5 ampere
Power:	Approximately 50 watts

Table 2—3. Optional SF Module Specifications

SEND SECTION	
Speed	
Range:	4.0 to 14.0 pps
Accuracy:	±0.2 pps
% Break	
Range:	10.0 to 89.9% break
Accuracy:	±0.5% break
Interdigit Time	
Range:	250 to 990 msec
Accuracy:	±1.0 msec
Frequency:	2600 Hz ± 15 Hz, (internal switch allows selection of 2400 Hz)
Fixed Levels (dBm 600 ohms)	
Toward Line, On-Hook:	−36 dBm
Toward Line, Pulsing:	−24 dBm
Toward Drop, On-Hook:	−13 dBm
Toward Drop, Pulsing:	−1 dBm
Level Control:	1 to 7 dB above fixed level in 2 dB steps 1 to 11 dB below fixed level in 1 dB steps
Level Accuracy:	±1 dB
Source Impedance:	600Ω balanced
Distortion:	< 1.5% THD
Balance:	> 50 dB at 2600 Hz
Dc Blocking:	150 Vdc maximum
Return Loss:	< 21 dB (200 to 3500 Hz)
RECEIVE SECTION	
Speed	
Range:	4 to 14 pps
Accuracy:	±0.1 pps

Table 2—3. (Cont'd)

% Break	
Total Range:	10 to 89.9% break
Total Range Accuracy:	±2.0% break
Normal Measurement Range:	50 to 75% break
Normal Measurement Range Accuracy:	±1.0% break

NOTE

Pulsing speed restricts the percent break range. Refer to Figure 4—8 for clarification.

Interdigit Time	
Range:	250 to 999 msec
Accuracy:	±1.0 msec
Bandwidth:	Must operate 2600 Hz ± 30 Hz Must not operate 2600 Hz ± 100 Hz (Internal switch permits selection of nominal 1.5 to 4 kHz bandpass)
Dynamic Range (ref. 600Ω)	
Pulsing:	+8 to −26 dBm
Steady Tone (On-Hook):	+8 to −38 dBm

NOTE

Sensitivity depends on direction of test. See Table 4—6.

Termination Impedance	
Line or Drop:	600Ω balanced
Monitor:	> 50 kΩ
Maximum Allowable 3 KHz Noise At Input:	40 dB below TLP
Balance:	> 50 dB at 2600 Hz
DC Blocking:	150 Vdc maximum
Return Loss:	> 21 dB (200 to 3500 Hz)
Receiving Indicator:	LED lamp (lighted when greater than minimum receiver level is present at RCV jack)

SECTION 3

INSTALLATION

3.1 This section provides information needed to install the Model 1260A Pulsing Test Set.

3.2 INITIAL INSPECTION

3.3 The Model 1260A was carefully inspected, both mechanically and electrically, before shipment. It should be free of defects and should be operating correctly when received. To confirm this, the set should be visually inspected for signs of damage that may have occurred during shipment. If there is shipment damage, notify the carrier immediately. Electrical operation can be checked by following the self check procedures contained in Section 4 (paragraphs 4.14 and 4.17).

3.4 SERVICE INFORMATION

3.5 Complete warranty information is contained in the purchase order agreement under terms and conditions of sale. Summarized briefly, the Northeast Electronics warranty extends for a period of one year to the original purchaser of a Northeast test instrument.

3.6 It is recommended that Northeast's Repair Department be contacted for assistance if, for any reason, a Northeast product fails to perform as expected. This step eliminates the needless delay entailed when a product is returned unnecessarily. Contact the Repair Department at Northeast Electronics, P.O. Box 2021, Concord, New Hampshire 03301, telephone: (603) 228-3700.

3.7 If a Northeast Electronics product requires factory servicing **during** the warranty period, be sure to include a ship-to-address and a description of the problem when returning the product to Northeast Electronics. **After** the warranty period has expired, equipment returned must be accompanied by all of the following:

- ☐ The number of the purchase order covering the cost of servicing,
- ☐ Bill-to-address,
- ☐ Ship-to-address,
- ☐ Description of problem.

3.8 In all cases, equipment requiring factory servicing should be sent to the Repair Department at the preceding address and telephone number. A return material authorization (RMA) number is **not** required, but will be provided by the Repair Department upon request.

3.9 MOUNTING INFORMATION

3.10 The Model 1260A is supplied with brackets that permit mounting in either 19-inch or 23-inch racks. When rack mounting is desired, install the Model 1260A and brackets according to Figure 3—1.

NOTE

When shipped from the factory, the Model 1260A is internally set for optimum performance in most applications. However, in some cases, it may be appropriate to change the internal factory settings at the time of installation. See paragraphs 4.39, 4.77, and 4.109.

3.11 No special installation instructions are required when the 1260A is used as a portable instrument.

3.12 POWER CONNECTIONS

3.13 Detailed information covering power connection is given in paragraph 4.6.

3.14 INSTALLING THE AC POWER OPTION

3.15 The ac power option, when ordered concurrently with the standard Model 1260A, is factory installed in the instrument. The option can also be purchased separately at a later time and installed in the field. Field installation of the ac power module can be accomplished as follows:

1. Remove the 1260A's top panel by removing three screws that secure the panel to the front of the instrument.

2. Face the rear of the instrument and locate a cover plate in the upper left portion of the rear panel.

3. Remove four screws that secure the cover plate located in step 2 above, and then remove the cover plate itself from inside the 1260A.

4. From the top of the instrument, slide the ac power option into place against the inside of the rear panel. The option should be positioned such that the ac receptacle, slide switch, and fuses face the outside through the rear panel opening as shown at the bottom of Figure 4—1.

5. Secure the ac power module to the rear panel with the four screws removed in step 3.

6. Refer to Figure 4—2 if necessary, and locate the 2-pin nylon plug built into the standard 1260A for use with the ac power option. Locate the matching plug attached to the ac power option itself.

7. Interconnect the two plugs identified in step 6 above. They are keyed to prevent misalignment.

8. Replace the top panel and three screws removed in step 1.

9. The instrument can now be operated from 115 or 230 Vac power. Be sure to follow the recommendations of paragraph 4.12.

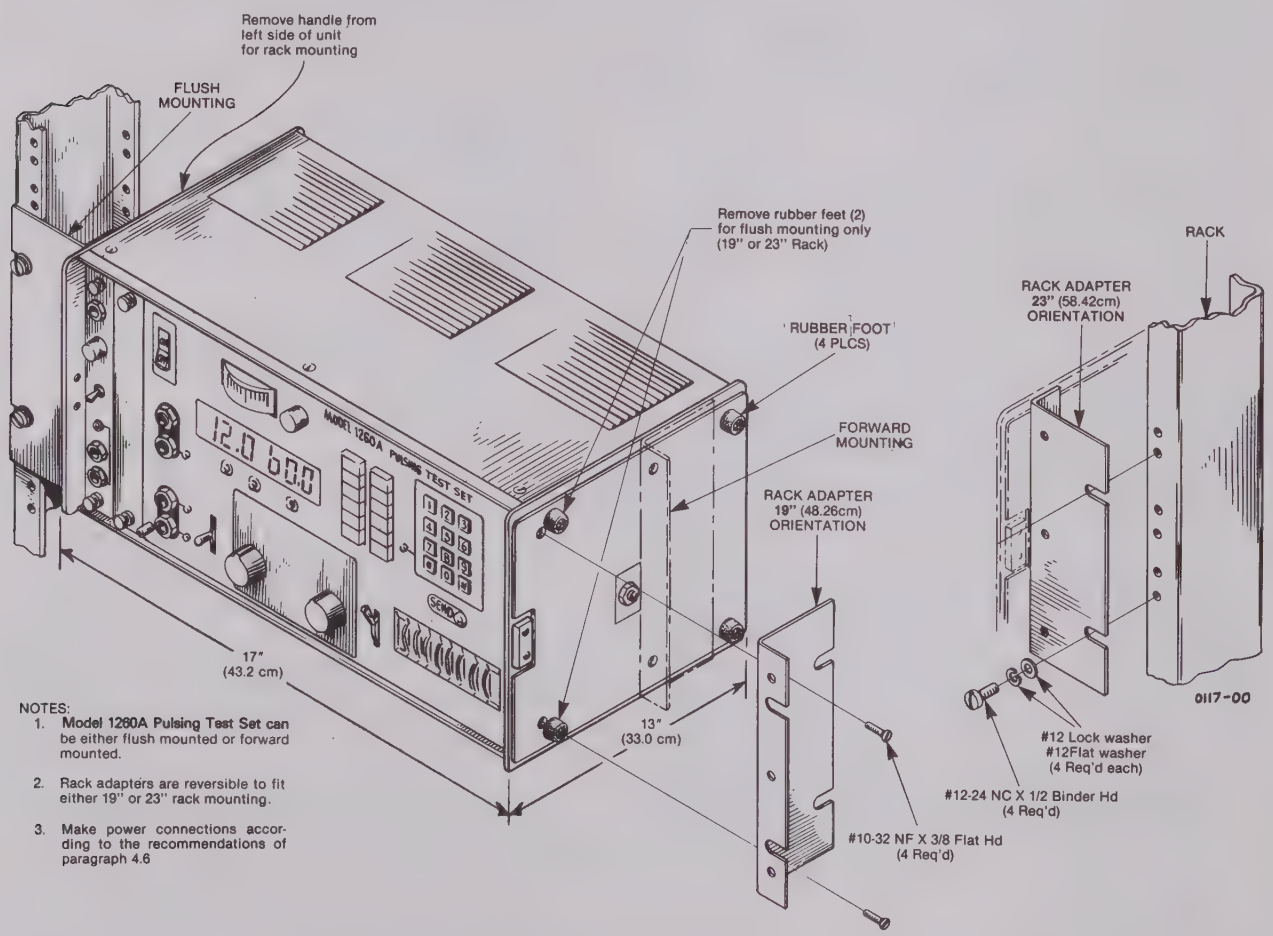

Remove handle from left side of unit for rack mounting
FLUSH MOUNTING
Remove rubber feet (2) for flush mounting only (19" or 23" Rack)
RUBBER FOOT (4 PLCS)
FORWARD MOUNTING
RACK ADAPTER 19" (48.26cm) ORIENTATION
RACK
RACK ADAPTER 23" (58.42cm) ORIENTATION
17" (43.2 cm)
13" (33.0 cm)
#12 Lock washer #12Flat washer (4 Req'd each)
#12-24 NC X 1/2 Binder Hd (4 Req'd)
#10-32 NF X 3/8 Flat Hd (4 Req'd)
0117-00
NOTES:
1. Model 1260A Pulsing Test Set can be either flush mounted or forward mounted.
2. Rack adapters are reversible to fit either 19" or 23" rack mounting.
3. Make power connections according to the recommendations of paragraph 4.6

Figure 3—1. Model 1260A Pulsing Test Set Rack Mounting

3.16 INSTALLING THE OPTIONAL SF MODULE

3.17 The optional SF plug-in module, when ordered concurrently with the standard Model 1260A, is factory installed in the instrument. The SF module can also be purchased separately at a later time and installed in the field. Field installation of the SF module can be accomplished according to the following steps.

NOTE

When shipped from the factory, the SF module is internally set for optimum performance in most applications. However, in some cases it may be appropriate to change the internal factory settings at the time of installation. See paragraph 4.109.

1. Place the Model 1260A's POWER switch in OFF position.

2. The SF module can be installed in either of two module slots located in the left portion of the 1260A front panel. (Refer to top of Figure 4—1 if necessary.) Empty slots are normally protected by cover plates.

3. Disengage (by pulling) the snap-lock fasteners on one of the front panel cover plates and remove the plate.

4. Unplug and remove the blank pc board from inside the exposed slot.

NOTE

Proper operation of the Model 1260A requires either a module or blank pc board plugged into each module slot.

5. Position the SF module such that its EXT OSC jack is at the top and slide the module into the exposed module slot. Align the module's snap-lock fasteners with the holes at the top and bottom of the slot.

6. Be sure the SF module is firmly plugged into the connector at the rear of the slot before locking in place with the snap-lock fasteners. (The fasteners lock when pushed in.)

7. The SF module is now ready for use.

SECTION 4

OPERATION

4.1 This section gives general operating information plus detailed descriptions of the 1260A's controls, indicators, and jacks. It is strongly recommended that the user become thoroughly familiar with the subject matter of this section before attempting the step-by-step application procedures of Section 5.

4.2 CONTROLS, INDICATORS, AND JACKS

4.3 The controls, indicators, and jacks for the basic Model 1260A are described in Table 4—1 and shown on Figure 4—1. Operating controls associated with optional items are covered separately in Tables 4—2 and 4—3.

Table 4—1. Standard Model 1260A Controls, Indicators, And Jacks

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
	POWER SECTION	
J6	CO BATT jack (side panel)	Type 310 jack for connection of central office battery input power (T = −48V, S = ground). Generally the most convenient dc power connector for portable operation.
TB1	−48 V terminal strip (back panel)	Screw terminal connections for central office battery input power. (Unmarked terminals are not used.) Generally the most convenient dc power connector for rack-mount operation.
J5	GND jack	Provides a CO ground reference connection for Model 1260A.
S1	POWER ON-OFF switch/indicator/2.5 ampere circuit breaker	When set to ON position, −48 V applied to unit and red indicator lights. When circuit breaker tripped, switch set to OFF position. When placed at ON position, breaker resets.
	SEND SECTION	
S20	SEND mode switch	Selects one of several loop, E&M, or SF send modes.
S21	ON HOOK/OFF HK + DIAL/CONT switch	Controls the on-hook/off-hook/pulsing status of the send port selected by the SEND mode switch. ON HOOK position sends a continuous on-hook signal. OFF HK + DIAL position sends a continuous off-hook signal until digits are dialed via keypad. Entered digits are outpulsed at selected speed, percent break and interdigit time. Upon completion of outpulsing, send port returns to steady off-hook. CONT position sends continuous stream of pulses at selected speed and percent break.

Table 4—1. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
DS4	SEND monitor lamp	Follows supervision and pulsing sent by 1260A: ☐ Lights during steady on-hook periods, ☐ Is dark during steady off-hook periods, ☐ Flashes during outpulsing.
S23, S24, S25	SEND PPS thumbwheels	Set outpulsing speed from 1.0 to 29.9 pulses per second in 0.1-pps increments. See paragraph 4.22 for illegal settings.
S26, S27, S28	SEND % BREAK thumbwheels	Set percent break for all outpulsing from 10.0 to 89.9 percent break in 0.1-percent increments.
S29, S30	SEND ID × 10 MSEC thumbwheels	When dialing from memory, these thumbwheels set the interdigit time from 10 to 990 milliseconds in 10-millisecond increments. When dialing in the immediate-dial mode, the ID thumbwheels determine the interdigit time only if each digit is entered prior to completion of outpulsing of preceding digit. Otherwise, the interdigit time is determined by the rate of digit entry. See paragraph 4.22 for illegal setting of ID thumbwheels.
S17	Dial Keypad	Provides for entry of digits to be dialed. Digits can be dialed immediately as entered, or stored for dialing from memory when desired. Refer to paragraph 4.26 for detailed instructions on the use of the keypad.
DS5	STORE DIGITS monitor lamp	Lights to indicate dialing digits are stored in memory. Flashes to indicate memory is ready to accept digits. Darkens when memory is cleared. (See paragraph 4.31.)
S5 through S10	LOOP RES switches	Select loop resistances to be placed in series with the line under test during loop outpulsing. Switches can be used in combination to select loop resistances from 100 to 6300 ohms in 100-ohm increments. Releasing all LOOP RES switches selects a resistance of zero ohms.
S11 through S16	LINE LEAK switches	Select leak impedance to be shunted across the line during loop outpulsing. Standard A, B, C, D, D1, and SF1 values are available. See Table 4—4.
RECEIVE SECTION		
S19	RECEIVE mode switch	Selects one of several loop, E&M, or SF receive modes.

Table 4—1. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
S18	E&M/LOOP key switch	Selects the termination/receive impedance for loop and E&M pulsing measurements. Also controls the E&M send/receive configuration. When a loop receive mode is selected (RECEIVE mode switch S19 set to either DRY LOOP or WET LOOP) the E&M/LOOP key switch provides the following functions: ☐ TERM position selects a 400 ohm resistive termination for loop pulsing measurements. ☐ BRDG WET position selects a bridging impedance exceeding 20 kohms for measurements on wet loops only. ☐ A-RELAY position selects an internal A-relay termination for loop pulsing measurements. The A-relay coil terminates the line under test, while measurements are made across the relay's contacts. (See Figure 4—9.) When any E&M send or receive mode is selected (via SEND/RECEIVE mode switches) the E&M/LOOP key switch provides the following functions: ☐ Either SEND-RCV position selects for the desired E&M pulsing measurement, a low impedance termination that approximates the normal in-service termination. In addition, the 1260A's E&M jacks are configured for sending as well as receiving toward line or drop. Two identical SEND-RCV positions are provided for flexibility in mixed loop and E&M operating modes. For example, when sending on E lead toward drop while receiving on loop basis, top position allows selection of 400-ohm termination for loop; bottom position allows selection of A-relay termination for loop. Either position permits sending on E-lead. ☐ THRU & MON position selects a bridging impedance exceeding 20 kohms for the desired E&M measurement. E&M jacks are through-connected (connected in parallel). This position inhibits sending on an E&M basis.
S3	MAX pushbutton	When pressed and held selects display of maximum (highest) pulsing speed and percent break measured since last reset.

Table 4—1. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
S4	MIN pushbutton	When pressed and held selects display of minimum (lowest) pulsing speed and percent break measured since last reset. NOTES 1. The speed and percent break values displayed concurrently when either the MAX or MIN pushbutton is pressed are not necessarily associated with the same pulse period. 2. Engaging both the MAX and MIN pushbuttons simultaneously resets the receive section. The display is cleared along with all stored measurement data.
S2	COUNT-ID-DIGITS pushbutton	Provides the following display functions: ☐ When released permits display of average received pulsing speed and percent break. ☐ When pressed and held selects a display of total count of all pulses received since last reset, plus a display of minimum (shortest) interdigit time measured. ☐ When alternately released and re-engaged (within 2 seconds of release) provides a means of selecting for display an individual dialed digit from among up to 16 digits received. Displayed with each digit is the interdigit time following that digit. In addition, each displayed digit is identified as to its position (from 1 to 16) in the received digit sequence. Refer to paragraphs 4.60 and 4.67 for a more detailed description of this pushbutton.
U1 through U6	PPS-PULSE COUNT-DIGIT and % BREAK-ID readouts	Six digit display for selective viewing of the data accumulated by the 1260A receive section.
M1	Meter	Provides an analog indication of percent break and on-hook/off-hook status in all receive modes.
R2	METER ADJ potentiometer	Allows meter percent break indication to be set to agree with digital readout.
INPUT/OUTPUT JACKS AND MONITOR INDICATORS		
J1	LOOP SEND 310 jack	Output port for loop pulsing.

Table 4—1. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
J2	LOOP RCV 310 jack	Input port for loop pulsing.
J3	E&M LINE 310 jack	Provides a means for sending on M lead towards line and receiving on E lead from line.
J4	E&M DROP 310 jack	Provides a means for sending on the E lead towards the drop and receiving on the M lead from the drop.
DS3	SLEEVE GND monitor lamp	Sleeve lead idle/busy indicator. Lights to indicate busy (presence of ground on sleeve of LOOP RCV jack).
DS1	E monitor lamp	E lead idle/busy indicator. Lights to indicate idle (absence of ground on tip of E&M LINE jack). Flashes while receiving E lead pulsing.
DS2	M monitor lamp	M lead idle/busy indicator. Lights to indicate idle (absence of battery on ring of E&M DROP jack). Flashes while receiving M lead pulsing.
	INTERNAL SWITCHES	
S22	E-Suppression circuit toggle switch	Provides a means of switching a 0.15-uF, 330-ohm suppression network across the 1260A's E lead pulsing contacts. This network emulates the actual pulsing suppressors found on many E lead pulsing receivers. Factory setting switches the suppression network out. Refer to paragraph 4.39 for more detailed information on this switch.
A6S1	Input pulse timer micro DIP switch	Determines the amount of transient/noise immunity possessed by the 1260A's receive section. Can be set to ignore transients less than 6.4, 12.8 or 25.6 milliseconds. Switch is set to 12.8-millisecond position at the factory. Refer to paragraph 4.77 for more detailed information on this switch.

4.4 Table 4—2 describes the controls associated with the ac power option as shown on Figure 4—1.

4.5 Table 4—3 describes the controls associated with the optional SF module as shown on Figure 4—1.

Table 4—2. Ac Power Option Controls, Jacks, And Fuses

REFERENCE DESIGNATOR	CONTROL, JACK OR FUSE	FUNCTION
J1	Ac jack (rear panel)	Receptacle for ac power cord supplied with option. Can accept either 115 V or 230 V, 50 to 60 Hz power.
S1	115/230 slide switch	Selects operation from either 115 V or 230 V ac power.
F1/F2	Ac line fuses	Provides 2 ampere overcurrent protection for the ac input line. One fuse protects each side of the line. **WARNING** **Disconnect power cord before checking fuses.**

Table 4—3. Optional SF Module Controls, Indicators, And Jacks

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
S3	DEV FR SND TLP rotary switch	Provides the capability of sending SF signaling above and below the module's fixed send levels. Levels up to 7 dB above fixed send levels can be selected in 2-dB steps. Levels as low as 11 dB below fixed send levels can be selected in 1-dB steps.
S2	SEND-RCV LINE/MON/ SEND-RCV DROP switch	Configures the SF module for bridging/monitoring line under test, or for send/receive testing towards line or drop. ☐ The SEND-RCV LINE position sets the appropriate transmitter send levels and receiver sensitivities for send/receive testing towards the line. (Refer to Table 4—6 for the send levels and receive sensitivities selected by this switch.) Also, the receiver is terminated in 600 ohms. ☐ The SEND-RCV DROP position sets the appropriate transmitter send levels and receiver sensitivities for send/receive testing towards the drop. The receiver is terminated in 600 ohms. ☐ The MON position enables monitoring of in-service SF circuits and high impedance (50-kohms) bridging measurements. A through-connection is established from the SF RCV jack to the SF SEND jack while the latter jack is isolated from the transmitter.
J1	EXT OSC 310 jack	Allows use of an external SF source for SF send testing. The send level present at the SF SEND jack will be as specified in Table 4—6 for the **internal** SF source if the external oscillator meets the following requirements: ☐ 0 dBm output level ±0.05 dB, ☐ 600-ohm output impedance, ☐ Output frequency of 200 to 3500 Hz. The internal SF source is automatically disabled when this jack is in use.
J2	SF SEND 310 jack	Module's SF output port.
J3	SF RCV 310 jack	Module's SF input port.
DS1	CKT IDLE monitor lamp	SF supervision indicator. Lights to indicate presence of SF tone (idle condition) at SF RCV jack. Flashes when SF pulsing is received.

Table 4—3. (Cont'd)

REFERENCE DESIGNATOR	CONTROL, INDICATOR OR JACK	FUNCTION
S1	Internal DIP multiple switch	Allows selection of the following: ☐ 2400 or 2600 Hz SF send frequency. (The latter is the normal selection.) ☐ Wideband (1.5 to 4 kHz) or narrow band (2600 ± 30 Hz) SF receiver. (The latter is the normal selection.) ☐ The desired send level augmentation technique as shown in Figure 4—11. Refer to paragraph 4.96 for more detailed information on this switch.

4.6 POWERING THE MODEL 1260A

4.7 Any Model 1260A can be conveniently powered by central office battery (42 to 56 volts dc) at a maximum load current of 1 ampere. In addition, models equipped with the ac power option can be operated from 115/230 volts ac, 50 to 60 Hz power.

4.8 DC OPERATION

4.9 Central office battery and ground can be applied to the 1260A via either a type 310 jack located on the right side panel or a rear panel barrier strip. The former is generally the most convenient connector for portable use while the latter is generally the most convenient connector for rack-mount operation.

4.10 When using the type 310 jack, be sure to connect battery to the tip and ground to the sleeve. On the barrier strip, battery connects to the terminal second from left while ground connects to the left-most terminal.

4.11 In all cases, the power cord should be 18 gauge or larger and not more than 10 feet long. (Use of standard transmission patch cord is **not** recommended.) If a power cord exceeding 10 feet is required, use larger than 18 gauge wire.

NOTE

For proper operation of the 1260A the power ground must be within 0.5 volt ac and dc of CO ground. If this is not the case, connect the 1260A's front panel ground lug (J5) to a "clean" CO ground using 18 gauge or larger wire. Also, if difficulty is encountered when operating the instrument, a separate CO ground connection to the front panel ground lug is recommended.

4.12 AC OPERATION

4.13 To operate the Model 1260A from ac power, connect the power cord supplied with ac power option to the mating rear panel receptacle. Be sure the 115/230 slide switch is set according to the voltage used. (In North America this is usually the 115-volt position.)

NOTE

For proper operation of the 1260A, the ac outlet must be a three-wire type with the NEMA ground lead within 0.5 volt ac and dc of CO ground. If this is not the case, connect the 1260A's front panel ground lug (J5) to a "clean" CO ground using 18 gauge or larger wire. Also, if difficulty is encountered when operating the instrument, a separate CO ground connection to the front panel is recommended.

4.14 MODEL 1260A SELF-CHECK

4.15 The Model 1260A's overall operational status can be verified by following the procedure given below. Operational checks for the optional SF module are covered separately in paragraph 4.17.

4.16 Check the 1260A's general operating condition by performing the following steps. (If necessary, refer to paragraph 4.45 for assistance in reading the digital display.)

1. Make desired power connections to instrument observing the recommendations of paragraph 4.6.

2. Place the 1260A POWER switch in ON position. The power indicator on the switch should light. The E&M supervision indicators also light.

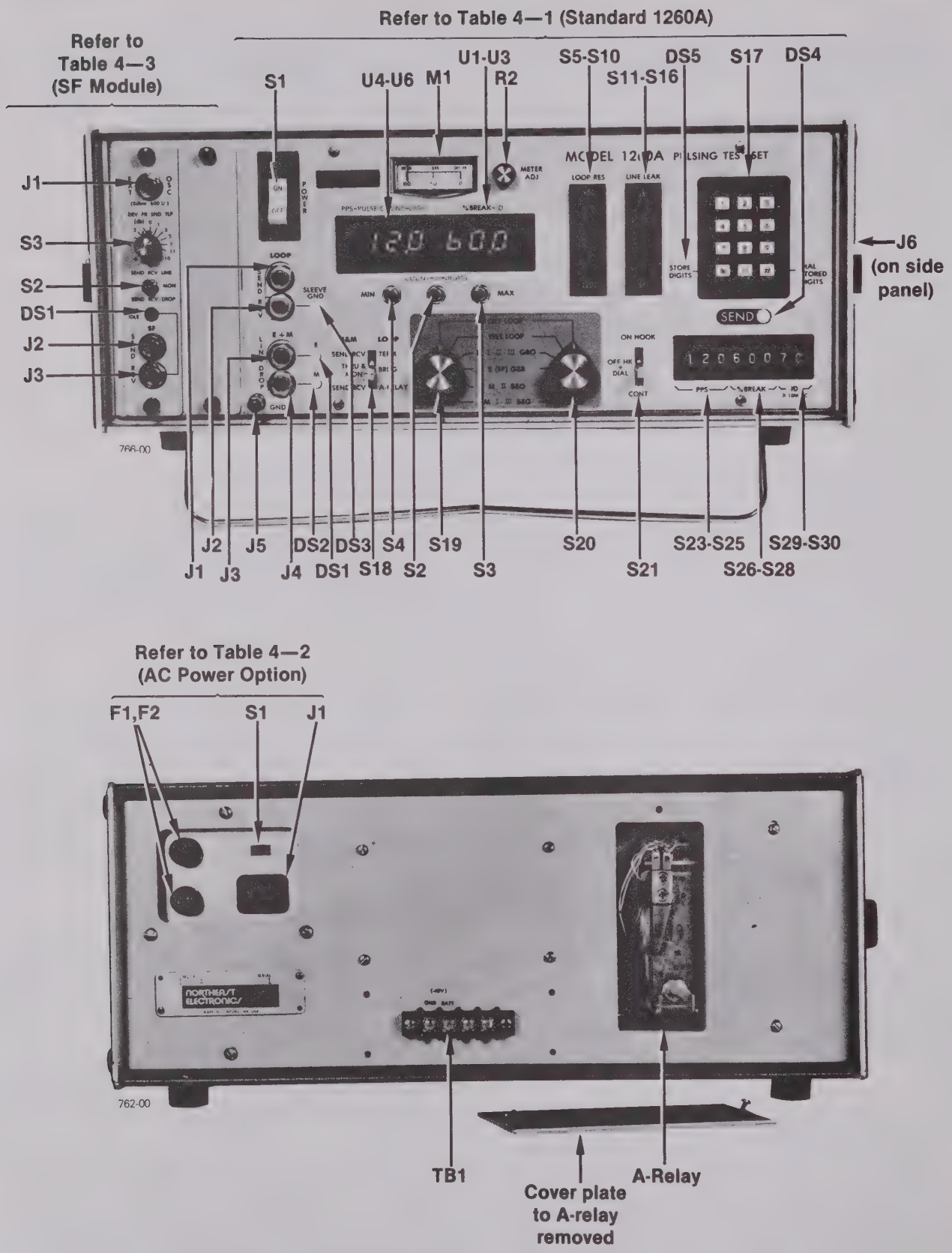


Figure 4—1. Model 1260A Controls, Indicators, And Jacks

3. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK. The SEND lamp should light.

4. Using a patch cord with a type 310 plug at each end connect the LOOP SEND jack to the LOOP RCV jack.

5. Set the E&M/LOOP switch to TERM.

6. Place both the SEND and RECEIVE switches at DRY LOOP.

7. Set the thumbwheel switches for a pulsing speed of 12.0 pps, 60.0 percent break, and an interdigit (ID) time of 700 milliseconds.

8. Release all LOOP RES and LINE LEAK pushbuttons.

9. Set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The analog meter should indicate off-hook. The SEND lamp goes out.

10. Clear the display by engaging both the MIN and MAX pushbuttons simultaneously. The decimal points on the display should disappear while both of these pushbuttons are pressed.

11. Release the MIN/MAX pushbuttons and set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. The display should indicate an average pulsing speed of 12.0 ± 0.1 pps and an average percent break of 60.0 ± 0.5 percent. The analog meter indicates approximately 60 percent break and the SEND lamp flashes. (If desired, set meter to exactly 60 percent break with METER ADJ control.)

12. Press and hold the MIN pushbutton. The display should indicate a minimum pulsing speed of 12.0 ± 0.1 pps and a minimum percent break of 60.0 ± 0.5 percent.

13. Release the MIN pushbutton and then press and hold the MAX pushbutton. The display should read as described for step 12 above. These are maximum values.

14. Set ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL.

15. Momentarily press both the MIN and MAX pushbuttons simultaneously to clear the display.

16. Enter a digit 2 on the keypad. The digit should be immediately out-dialed resulting in a display of 12 ± 0.1 pps and 60.0 ± 0.5 percent break.

17. Momentarily press both the MIN and MAX pushbuttons simultaneously to clear the display.

18. Enable the dialer memory to accept digits by entering a "*" on the keypad. The STORE DIGITS lamp should flash. **Quickly** proceed to step 19.

19. Enter digits 0 through 1 on the keypad in descending order (i.e. 0, 9, 8, 7, etc.).

20. Press the "*" key again to exit the digit entry mode. the STORE DIGITS lamp should light without interruption. This indicates digits are stored in memory ready to be out-dialed upon command.

21. Initiate the dialing of the stored digits by pressing the "#" key. As the digits are being dialed the display shows 12.0 ± 0.1 pps and 60.0 ± 0.5 percent break. When the dialing is complete the STORE DIGITS lamp remains lit.

22. Press and hold the COUNT-ID-DIGITS pushbutton. The left portion of the display should indicate a total pulse count of 55 (displayed as 055). The right portion of the display shows a minimum interdigit (ID) time of 700 ± 2 milliseconds.

23. To display data pertaining to the first digit dialed (the digit 0), release the COUNT-ID-DIGITS pushbutton and then re-engage and hold within 2 seconds of release. The resulting display is interpreted as follows.

- ☐ The left-most displayed digit, a "1", indicates that the dialed digit under consideration occupies the first position in the received digit sequence.
- ☐ The middle displayed digit, a "0", gives the identity of the dialed digit occupying the first position in the received sequence.
- ☐ The right-most three digits displayed show the interdigit time (in milliseconds) following the dialed digit 0. The interdigit time indicated should be 700 ± 2 milliseconds.

24. Release the COUNT-ID-DIGITS pushbutton again and then re-engage and hold within 2 seconds of release. Display should show a position indicator of 2, the second dialed digit (a "9"), and the following interdigit time (700 ± 2 milliseconds).

25. Step to similar displays for the remaining digits dialed by alternately releasing and re-engaging the COUNT-ID-DIGITS pushbutton. The last digit dialed, the digit 1, will have a position indicator of •0 representing position 10. Also, since the last dialed digit is not

followed by a nominal 700-millisecond interdigit time, a flashing "999" is displayed to denote a steady off-hook exceeding 999 milliseconds.

26. Release the COUNT-ID-DIGITS pushbutton. After approximately 2 seconds the readout will revert to a display of average pulsing speed and percent break (12.0 ± 0.1 pps and 60.0 ± 0.5 percent break).

4.17 SF MODULE SELF-CHECK

4.18 The overall operational status of the optional SF module can be verified by performing the steps below. For this procedure, the module should be installed in the Model 1260A as described in Section 3. (If necessary, refer to paragraph 4.45 for assistance in reading the digital display.)

1. If necessary, connect Model 1260A to a source of power (observing recommendations of paragraph 4.6) and place POWER switch in ON position.

2. Remove patch cords connected to Model 1260A LOOP and E&M jacks, if any.

3. Using a patch cord with a type 310 plug at each end connect the SF module's SF SEND jack to its SF RCV jack.

4. Set the DEV FR SND TLP control on the SF module to 0 dB position.

5. Set the SF module's SEND-RCV LINE/MON/SEND-RCV DROP switch to SEND-RCV DROP.

6. Set the Model 1260A's SEND and RECEIVE rotary switches to E (SF) G&B.

7. Set the Model 1260A's thumbwheel switches for a pulsing speed of 12.0 pps, 60.0 percent break, and an interdigit (ID) time of 700 milliseconds.

8. On the Model 1260A, set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK. The SF module's CKT IDLE lamp should light indicating the presence of continuous SF tone.

9. Set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SF module's CKT IDLE lamp should extinguish.

10. Set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. The SF module's CKT IDLE lamp should flash in approximate syncronous with the 1260A SEND lamp. The 1260A display shows an average pulsing speed of 12.0 ± 0.1 pps and an average percent break of 60.0 ± 1.0 percent. The analog meter indicates approximately 60 percent break.

4.19 GENERAL SEND SECTION INFORMATION

4.20 OUTPULSE TIMING SELECTION

4.21 The Model 1260A's SEND thumbwheel switches permit exact selection of desired pulsing speed, percent break, and interdigit time over a wide range. Table 2—1 lists accuracy and range data for each of these parameters.

4.22 Built-in mechanical stops prevent the selection of many, but not all, illegal (out-of-range) thumbwheel settings. Selectable illegal settings initiate a flashing error display consisting of six " ⊏ " characters. The 1260A is inhibited from all outpulsing and measuring when any thumbwheel is set to an illegal position.

4.23 Selectable illegal settings are as follows:

- ☐ Interdigit (ID) time of 0 milliseconds,
- ☐ Any pulsing speed less than 1.0 pps.

4.24 Certain combinations of pulsing speed, percent break, and interdigit time; although obtainable from the 1260A send section; are **not** measurable by the receive section. This is an important consideration when using the instrument in combined send/receive operating modes.

4.25 Measurable combinations of pulsing speed and percent break are discussed in paragraph 4.81. The 1260A cannot measure or recognize interdigit times less than 250 milliseconds.

4.26 OVERVIEW OF PRECISION DIALING

4.27 The 1260A keypad permits precision out-dialing in either of two modes:

- ☐ An immediate-dial mode in which digits are outpulsed as entered,
- ☐ A dial-from-memory mode in which previously stored digits are automatically dialed upon command.

4.28 Any number of digits can be dialed in the immediate-dial mode. They are always outpulsed at the selected pulsing speed and percent break. Also, the ID thumbwheels determine the interdigit time if each digit is entered prior to completion of outpulsing of the preceding digit.

4.29 Up to 16 digits can be stored for automatic dialing from memory. The dialing of the entire 16-digit sequence is initiated by a single keystroke. The sequence can be automatically redialed as many times as desired.

4.30 Digits dialed from memory are always sent at the selected pulsing speed, percent break and interdigit time.

4.31 The send procedures of Section 5 contain step-by-step instructions for precision dialing on various types of circuits. Refer to the appropriate send procedure for assistance when dialing on a desired circuit with the Model 1260A. To load digits to be dialed into memory, follow steps 1 and 2 below.

1. On the keypad, momentarily press the * key to place the instrument in the memory-entry mode and quickly enter the desired digits (up to 16 maximum). The STORE DIGITS lamp flashes to indicate memory is ready to accept digits. Digits must be entered within approximately 10 seconds of each other to maintain instrument in memory-entry mode. (First digit must be entered within 10 seconds of pressing * key.)

2. The memory-entry mode can be exited in any of four ways:

- ☐ Momentarily pressing the * key a second time,
- ☐ Waiting approximately 10 seconds after entry of last digit,
- ☐ Entering a 16th digit,
- ☐ Pressing the # key. If ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position, this action initiates the dialing sequence as described in Section 5.

After entering one or more digits, the STORE DIGITS lamp lights without interruption (no flashing) upon leaving the memory-entry mode by any of the four methods described above. This indicates digits are stored in memory ready to be dialed upon command (i.e. by pressing the # key as described in Section 5).

4.32 After the stored sequence has been dialed out, the STORE DIGITS lamp remains lit indicating the fact that the previously entered digits are still stored in memory. The sequence can be redialed as many times as desired by simply pressing the # key.

4.33 The dialing number can be changed by repeating steps 1 and 2 in paragraph 4.31. The stored number can be erased from memory by momentarily pressing the * key twice, or by momentarily pressing it once and waiting approximately 10 seconds. In either case the STORE DIGITS lamp goes out signifying the memory is cleared.

4.34 An in-process dialing sequence can be terminated if necessary by placing the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK. Alternatively, dialing can be aborted by pressing the # key a second time.

4.35 SELECTING LOOP RESISTANCE AND LINE LEAK NETWORKS

4.36 A number of built-in loop resistance and line leak networks are selectable when sending loop pulsing. These networks simulate the effects of various lengths and types of loops, and thus are specified by many practices dealing with pulse testing. The networks are especially useful for many margin testing applications. Loop and leak networks are not selectable in E&M or SF send modes.

4.37 The LOOP RES pushbuttons allow selection of loop lengths up to 6300 ohms (i.e. they select up to 6300 ohms of resistance to be placed in series with the line under test during loop outpulsing). The pushbuttons can be used in combination to obtain resistances in 100-ohm increments. For example, engaging both the 100 and 200 pushbuttons selects a loop resistance of 300 ohms.

4.38 The LINE LEAK pushbuttons provide a number of standard leak impedances as specified by many pulse testing practices. The selected impedance is shunted across the line during loop outpulsing. Each leak impedance and the type of line it emulates is shown in Table 4—4.

4.39 SELECTING E LEAD CONTACT SUPPRESSION

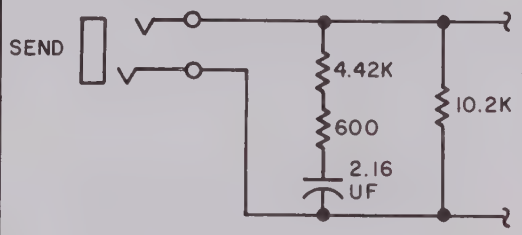
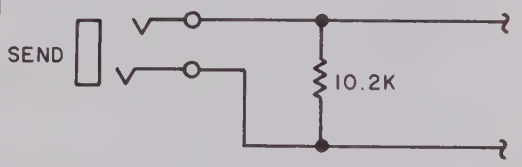
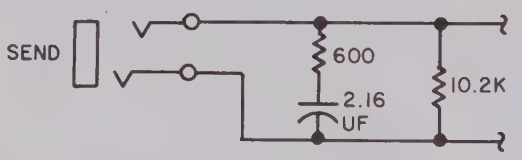
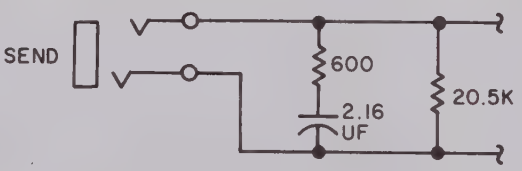
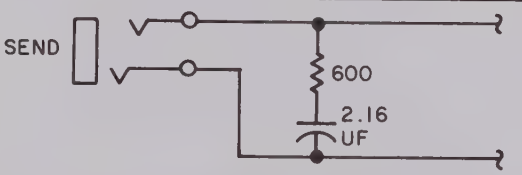
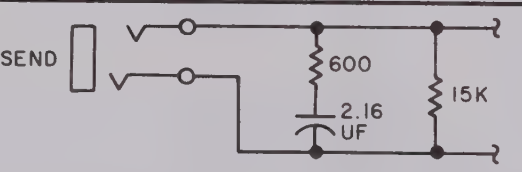
4.40 A built-in 0.15-microfarad, 330-ohm suppression network can be connected across the 1260A's E lead pulsing contacts to emulate the actual pulsing conditions existing in many E&M signaling arragements. This contact suppression network is switched either in or out by an internal toggle switch. The Model 1260A is shipped from the factory with the network switched out.

4.41 To change the setting of the internal E lead contact suppression toggle switch perform the following steps.

1. Remove the 1260A's top panel by removing three screws that secure the panel to the front of the instrument.

2. Refer to Figure 4—2 and locate the E lead contact suppression toggle switch in the front-center portion of the instrument.

Table 4—4. Selectable Line Leak Networks

LEAK	SCHEMATIC	SIMULATES
NONE (all switches released)		Open circuit.
A		A subscriber line near the central office equipped with 5 C4A ringing bridge extensions and a 15 kΩ leak on the drop wire.
B		A sender output without contact protection and with a 10.2 kΩ leak.
C		A circuit sender loop pulsing network with a 10.2 kΩ leak across the trunk.
D		A sender output with a leak of 20.5 kΩ.
D1		Normally used with dial pulse sender circuits for loop pulsing to improve the percent break at the distant selector or connector "A" relay contacts.
SF1		A sender output with a 15 kΩ leak.

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3. To switch the E lead contact suppression network in, place the toggle switch in the forward position (toward the front panel). To switch the network out, place the toggle switch in the opposite position.

4. Replace top panel and screws removed previously.

4.42 SEND SECTION OVERCURRENT PROTECTION

4.43 The Model 1260A's sender output is internally fused at 1 ampere. The fuses associated with this function are shown on Figure 4—2. They should be checked and replaced as necessary if difficulty is encountered while using the send section. A spare fuse is built-in for this purpose. (The 1260A top panel can be removed as described in paragraph 4.41.)

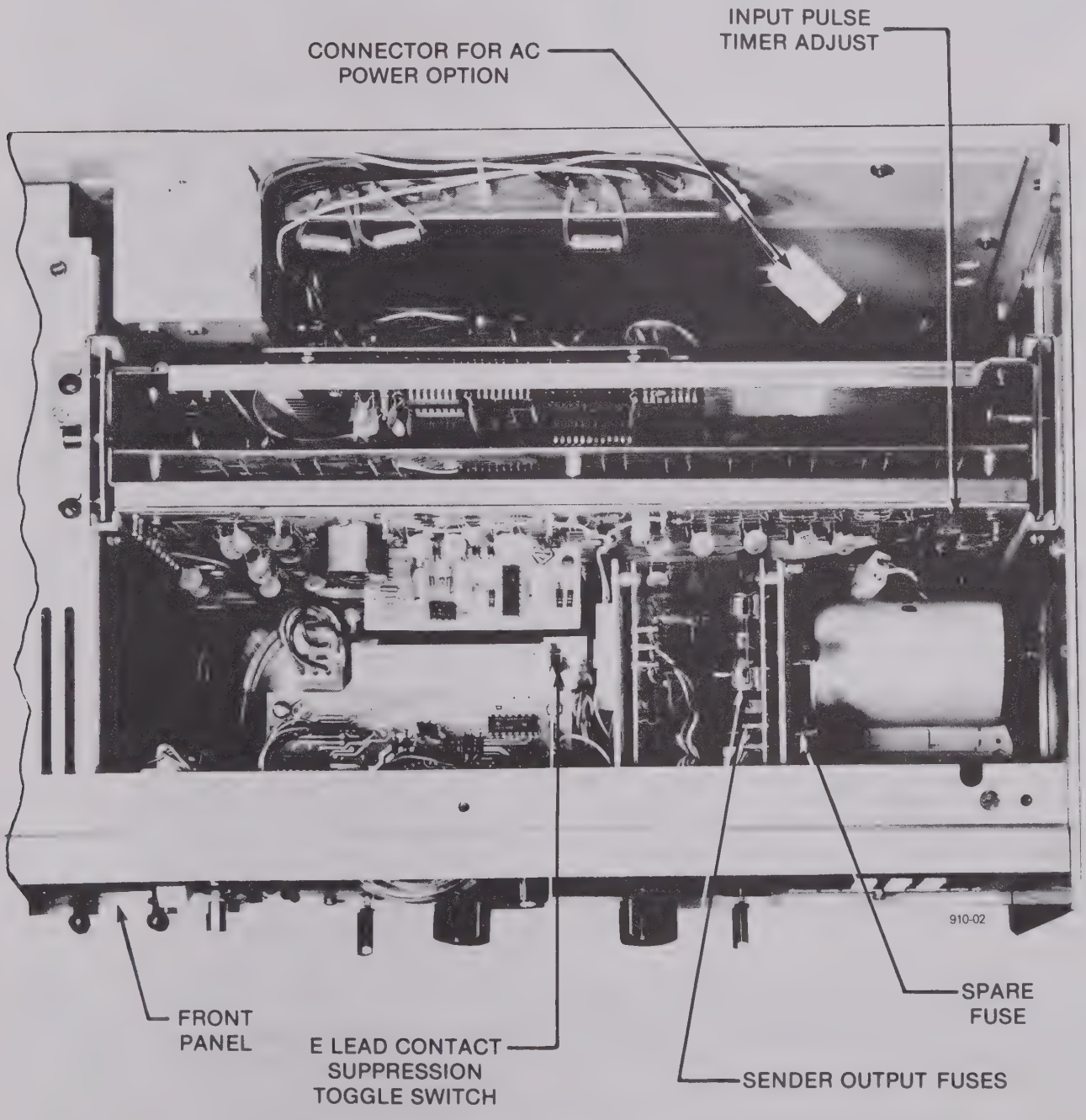

Figure 4—2. Model 1260A Internal Switches

4.44 GENERAL RECEIVE SECTION INFORMATION

4.45 READING THE DISPLAY

4.46 The Model 1260A's digital readout selectively displays all of the following pulse measurement data:

- ☐ Average pulsing speed and percent break,
- ☐ Minimum/maximum pulsing speed and percent break,
- ☐ Total count of all pulses received for multiple pulses/digits in a string,
- ☐ Minimum interdigit time for digits in a string,
- ☐ Identity of each digit received and the position of that digit in a multi-digit sequence,
- ☐ The actual interdigit time following each received digit.

4.47 Following paragraphs describe in detail the display for each measurement parameter.

NOTE

If a flashing display consisting of six " ⊏ " characters is observed at any time, refer to paragraph 4.22 for an explanation.

4.48 Pre-Measurement Reset

4.49 Momentarily pressing both the MIN and MAX pushbuttons together resets the Model 1260A's receive section and clears the display as shown by Figure 4—3. This should be done prior to making any measurement, even if no digits are displayed.

4.50 The pre-measurement reset ensures that all previously stored information is cleared from the receive section before new data is accumulated. The previously stored information can include valid measurement results as well as invalid data caused by unintentional on-hook/off-hook transitions occurring on the line under test.

4.51 When both the MIN and MAX pushbuttons are engaged, the display becomes completely blank. Upon release, two decimal points appear with all digit positions remaining blank.

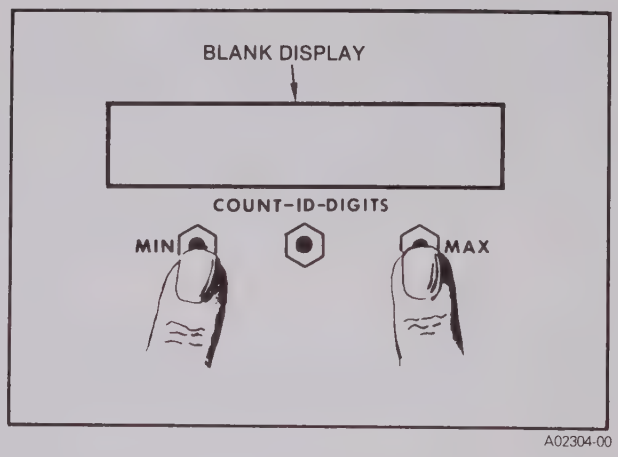

Figure 4—3. Clearing The Display

4.52 Average Pulsing Speed And Percent Break

4.53 These are the parameters that are "normally" displayed by the instrument. That is, they appear on the readout when pushbuttons that select displays of other information are all released.

4.54 Average pulsing speed, expressed in pulses per second, is displayed on the left portion of the display while average percent break is displayed on the right. As shown by Figure 4—4, pulsing speed measurements have a resolution of 0.1 pps and percent break measurements a resolution of 0.1 percent.

4.55 If a continuous string of pulses is monitored, the Model 1260A averages pulsing speed and percent break over the last group of 10 pulses received, and then displays those averages. Hence, the display is automatically updated every 10 pulses when measuring continuous pulsing.

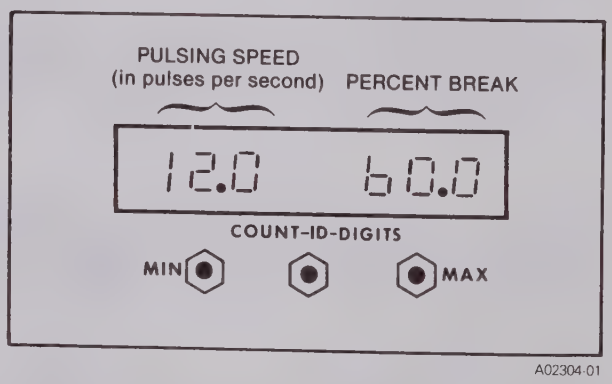

Figure 4—4. Average Pulsing Speed And Percent Break Display

4.56 For inputs consisting of one or more dialed digits, pulsing speed and percent break are averaged over the last non-one digit received. This results in an updated display for each analyzed digit.

4.57 The instrument will **not** provide pulsing speed and percent break measurement data for digits having a value of 1. In addition, certain out-of-range pulsing speed/percent break combinations are not displayed. Measurement results for other out-of-range pulsing speed/percent break combinations are obtainable, but of unacceptable accuracy. Refer to paragraph 4.81 for the out-of-range pulsing speed/percent break combinations.

4.58 Minimum/Maximum Pulsing Speed And Percent Break

4.59 Pressing and holding the MIN pushbutton displays the minimum pulsing speed and percent break measured since last reset. Similarly, engaging the MAX pushbutton selects for display maximum pulsing speed and percent break values. As shown by Figure 4-5, these displays are similar to the average pulsing speed and percent break display.

NOTES

1. The pulsing speed and percent break values displayed concurrently when either the MIN or MAX pushbutton is pressed are not necessarily associated with the same pulse period.
2. The restrictions of paragraph 4.57 are applicable to both minimum and maximum speed/percent break measurements.

4.60 Total Pulse Count/Minimum Interdigit Time

4.61 Pressing and holding the COUNT-ID-DIGITS pushbutton selects for display:

- ☐ The total count of all pulses received since last reset,
- ☐ The minimum interdigit time measured since last reset.

4.62 As shown by Figure 4—6, total pulse count is displayed on the left portion of the display, while minimum interdigit (ID) time is displayed on the right. Minimum interdigit time is expressed in milliseconds with a resolution of 1 millisecond.

4.63 The instrument displays pulse counts up to 999. If pulses in excess of this amount are received, a flashing "999" pulse count display signals the presence of an over-range condition. The pulse count over-range display is cleared via the MIN/MAX pushbuttons as described in paragraph 4.48.

4.64 Similarly, the minimum interdigit time display goes over-range for interdigit times exceeding 999 milliseconds. A flashing "999" minimum interdigit time display indicates the presence of this over-range condition. The minimum interdigit time over-range display is cleared via the MIN/MAX pushbuttons.

4.65 The minimum interdigit time over-range display appears both during and after the monitoring of continuous pulsing (if selected via the COUNT-ID-DIGITS pushbutton). This condition is normal and indicates a valid interdigit time measurement was not made.

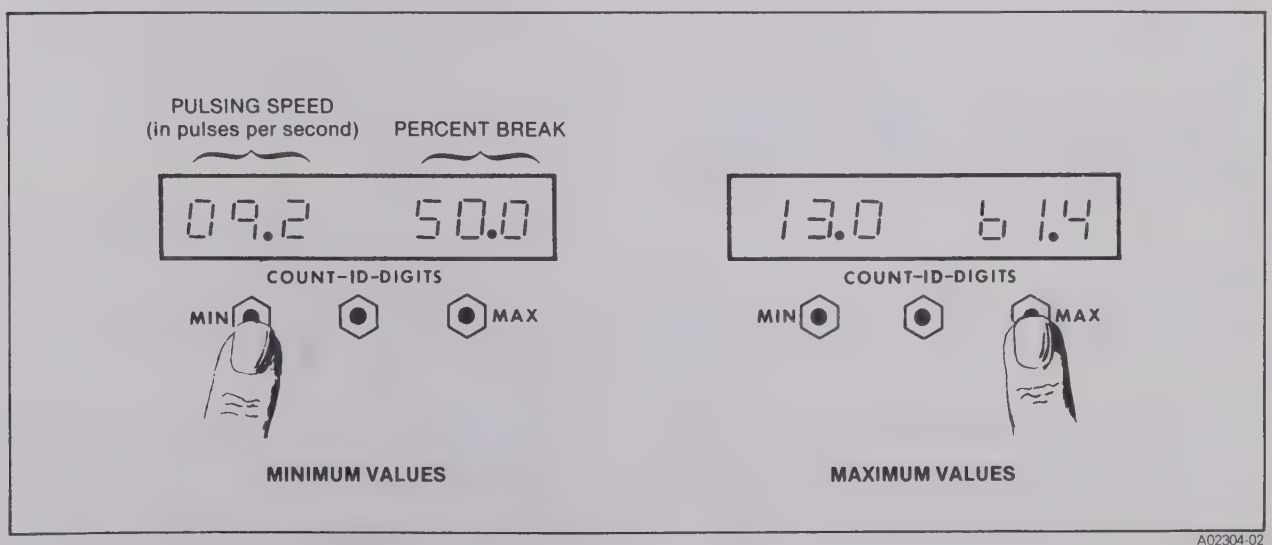

Figure 4—5. Typical Min/Max Pulsing Speed And Percent Break Displays

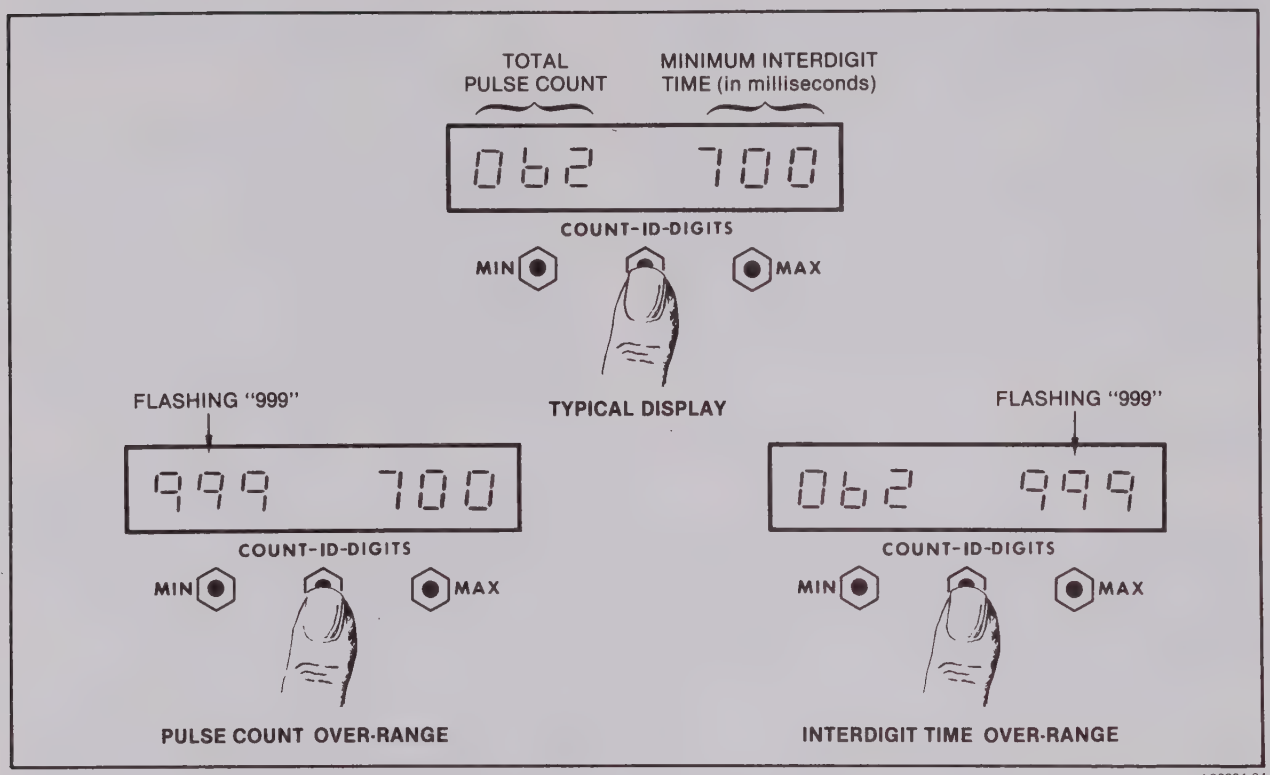

Figure 4—6. Total Pulse Count/Minimum Interdigit Time Displays

4.66 The Model 1260A cannot measure or recognize interdigit times less than 250 milliseconds. Thus, two digits separated by less than 250 milliseconds of steady off-hook are handled as a single string of pulses as described in paragraph 4.74.

4.67 **Individual Digits And Interdigit Times**

4.68 The COUNT-ID-DIGITS pushbutton also provides a means of stepping from the total pulse count/minimum interdigit time display described above, to displays for each individual digit (up to 16 digits maximum). A procedure for selecting these displays is given in paragraph 4.76.

4.69 An individual digit display supplies the following information:

- ☐ The identity (value) of the selected dialed digit,
- ☐ The position (from 1 to 16) that digit occupies in the received digit sequence,
- ☐ The actual interdigit time (in milliseconds) following the dialed digit being displayed.

4.70 The instrument can provide individual digit displays for a maximum of 16 dialed digits. The first digit received is assigned a position indicator of 1, the second a position indicator of 2, and so forth. Individual digit displays for the 17th and subsequent digits are not obtainable, and thus the digits displayed are always the first 16 received.

4.71 The display for an individual received digit is organized as shown on Figure 4—7. The position identifier appears at the left of the readout, the dialed digit in the center, and the interdigit time at the right. Position indicators 10 through 16 are displayed as •0 through •6. Interdigit time is expressed in milliseconds with a resolution of 1 millisecond.

4.72 Digits consisting of more than 10 pulses are identified with a " ⊂ " character (for continuous pulsing) as shown on Figure 4—7. Thus, a " ⊂ " always appears as the first digit when continuous pulsing serves as the input. Subsequent digit positions are blank (except for position identifiers).

4.73 The display of measured interdigit time for an individual digit has the same over-range indication described previously for the minimum interdigit time display. That is, interdigit times exceeding 999 milliseconds are indicated by a flashing "999". Also, since the last received digit or pulse group is not followed by a true interdigit interval, a flashing "999" always

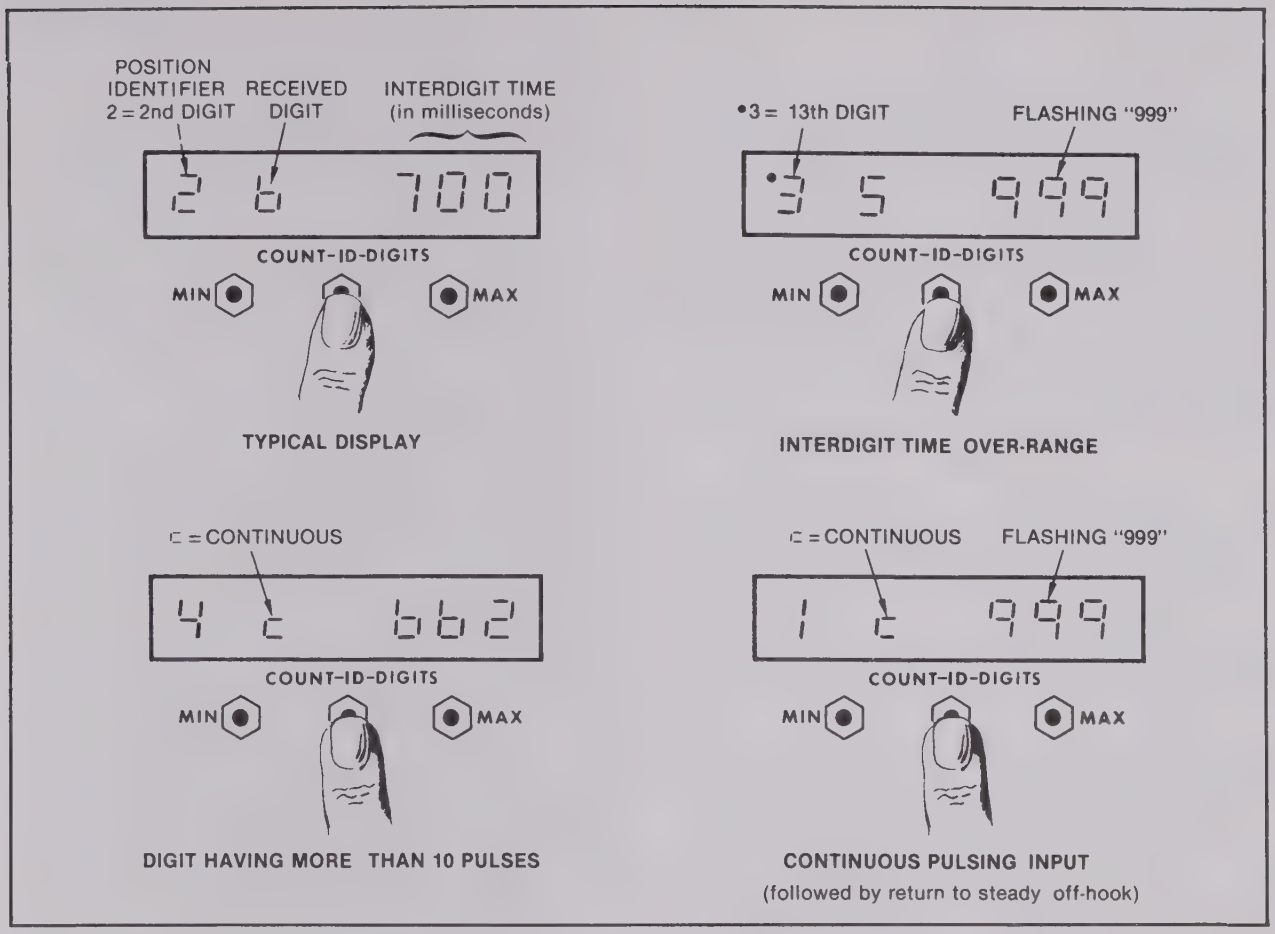

Figure 4—7. Individual Digit Displays

appears in the display of the last digit to denote a steady off-hook exceeding 999 milliseconds.

4.74 As mentioned previously, the Model 1260A cannot measure or recognize interdigit times less than 250 milliseconds. Thus, two digits separated by less than 250 milliseconds of steady off-hook are handled as a single string of pulses.

4.75 For example, if a digit 4 is separated from a following digit 5 by less than 250 milliseconds of steady off-hook, a digit 9 is displayed since the instrument recognizes a total of 9 uninterrupted pulses. (A " c " appears for totals greater than 10.) The interdigit time displayed with the "9" is the off-hook interval following the digit 5 assuming it is of sufficient length. Although the number of digits recognized is one less than the number sent, the instrument displays the correct total pulse count.

4.76 To select the individual digit displays described in the previous paragraphs, perform the following steps.

1. Select the total pulse count/minimum interdigit time display by pressing and holding the COUNT-ID-DIGITS pushbutton.

2. Release the COUNT-ID-DIGITS pushbutton and then re-engage and hold within 2 seconds of release. Data for the first received digit should appear on the display (position indicator equals 1).

3. Step through displays for the remaining stored digits by alternately releasing and re-engaging the COUNT-ID-DIGITS pushbutton as described in step 2 above.

4. Release the COUNT-ID-DIGITS pushbutton. After approximately 2 seconds, the readout will revert to a display of average pulsing speed and percent break.

4.77 INPUT PULSE TIMING

4.78 The Model 1260A times each pulse it receives in order to differentiate between true pulses and noise (or transients). The instrument is set at the factory to ignore pulses shorter than 12.8 milliseconds. This is generally the optimum setting for most applications.

4.79 Settings of 6.4 and 25.6 milliseconds are available for applications where required. A shorter timing interval permits detection of shorter pulses (wider pulsing speed and percent break measurement range - see Figure 4–8); a longer timing interval provides greater noise/transient immunity.

NOTE

The input pulse timer setting has a significant impact on the instrument's pulsing speed/percent break measuring range. See paragraph 4.81 and Figure 4–8.

4.80 To change the input pulse timer setting perform the following steps.

1. Remove the 1260A's top panel by removing three screws that secure the panel to the front of the instrument.

2. Refer to Figure 4–2 and locate the micro DIP switch that controls the input pulse timing interval.

3. Using a small screwdriver or alignment tool, set the input pulse timer switch for the desired timing interval.

☐ Position 1 selects a 6.4 millisecond interval.

☐ Position 2 selects a 12.8 millisecond interval.

☐ Position 3 selects a 25.6 millisecond interval.

☐ Other positions are unused.

4. Replace top panel and screws removed previously.

4.81 MEASURABLE COMBINATIONS OF PULSING SPEED AND PERCENT BREAK

4.82 Certain combinations of pulsing speed and percent break are outside the instrument's measurement range. The actual measurement range provided depends on the input pulse timer setting described above in paragraph 4.77.

4.83 Figure 4–8 shows the 1260A's pulsing speed/percent break measurement range for all positions of the input pulse timer switch. Out-of-range pulsing speed/percent break combinations, if received by the instrument, result in either (a) no pulsing speed/percent break values appearing on the digital readout, or (b) values of unacceptable accuracy.

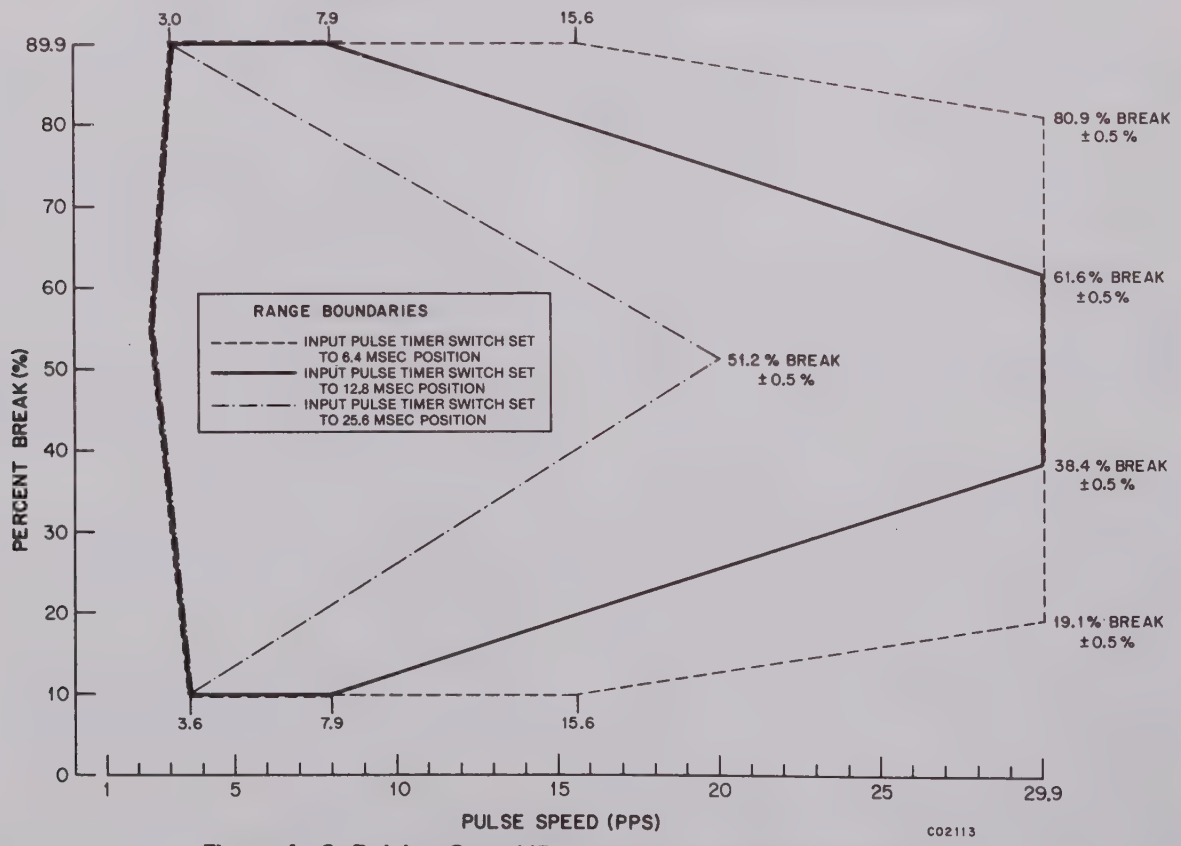

Figure 4–8. Pulsing Speed/Percent Break Measurement Range

4.84 USING THE INTERNAL A-RELAY

4.85 A built-in A-relay termination is selectable for loop pulsing measurements when required. A test A-relay, the specified termination of many pulse testing practices, is especially useful anytime it is desired to substitute for a circuit's in-service A-relay termination.

4.86 The Model 1260A's internal A-relay is an Automatic Electric type 221A incoming selector relay. As shown on Figure 4—9, the relay's split coil terminates a loop under test when the E&M/LOOP switch is at A-RELAY position. The A-relay contacts are switched to the instrument's measuring circuits if either loop receive mode is selected. Thus, pulses appearing on the loop under test are repeated by the A-relay and then applied to the measuring circuits. When repeating wet loop pulsing, the tip input must be negative and the ring input positive.

4.87 The actual percent break measured across the A-relay's contacts depends on battery voltage, loop resistance, leak impedance, and other factors. The relationship between percent break and battery voltage is shown in Figure 4—10.

4.88 The instrument's A-relay is factory adjusted and tuned to conform to Table 4—5. Periodic adjustment of the A-relay's spring tension may be required to meet the dynamic test specification listed in the table. This is especially true if the instrument is transported often.

4.89 To check the dynamic test specification listed in Table 4—5, perform the following steps.

1. Connect the instrument to a 49 ± 0.2 Vdc power source or, if the instrument has the ac power option, to a source of 115/230 Vac power. Refer to paragraph 4.6 if necessary.

2. Make the following initial switch settings.

☐ Set POWER switch to ON.

☐ Engage LOOP RES 800 and 400 pushbuttons. (Selects 1.2 kohms of loop resistance.)

☐ Engage LINE LEAK A pushbutton.

☐ On the SEND thumbwheels select a pulsing speed of 12.0 pps, percent break of 60.5 percent, and any non-zero interdigit time.

☐ Set ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK.

☐ Set both SEND and RECEIVE controls to DRY LOOP.

☐ Set E&M/LOOP switch to A-RELAY.

3. Using a patch cord with a type 310 plug at each end, connect the LOOP SEND jack to the LOOP RCV jack.

4. Clear the display (even if blank) by engaging both the MIN and MAX pushbuttons simultaneously.

5. Set the ON HOOK/OFF HK + DIAL/CONT switch to CONT.

6. The digital readout should indicate 60.5 ± 0.5 percent break. (Refer to paragraph 4.52 if necessary to read the display.) If this reading is not obtained, the 1260A's A-relay should be tuned accordingly. Access

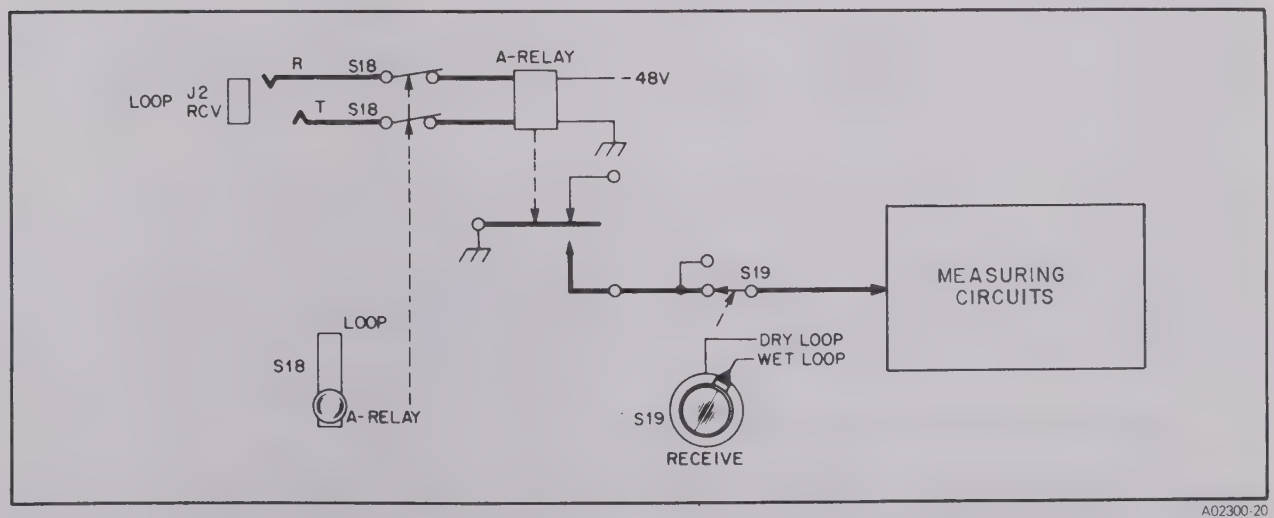

Figure 4—9. Internal A-Relay Termination

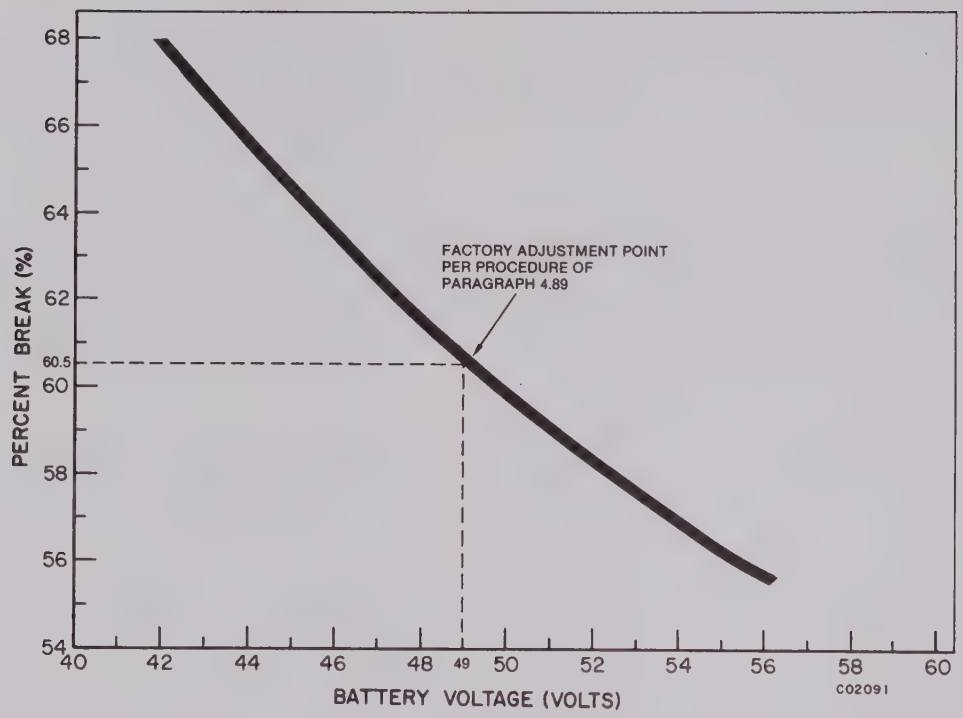

Figure 4—10. A-Relay Percent Break Versus Battery Voltage

to the A-relay is obtained via the rear panel as shown in Figure 4—1. Use standard relay tuning procedures.

7. This completes the A-relay dynamic test.

Table 4—5. A-Relay Calibration Specifications

PARAMETERS	SPECIFICATIONS
Break Gap	0.006 in
Make Gap	0.004 in
Residual	0.009 in
Readjust Operate Current	16.5 mA
Readjust Non-Operate Current	14.4 mA
Dynamic Test	60.5 ± 0.5 percent break*

*When pulsed with 49 ± 0.2 Vdc at 12 pps, 60.5 percent break, 1.2 kohms loop resistance, and leak A. See procedure given in paragraph 4.89.

4.90 GENERAL INFORMATION ON SF MODULE

4.91 The optional SF module is intended primarily for send/receive testing of 2600-Hz SF signaling systems. Use with SF signaling systems employing other frequencies is possible as described in paragraph 4.102.

4.92 The SF module is enabled to send SF signaling only when the Model 1260A's SEND mode switch is at E (SF) G&B position **and** a patch cord is inserted in the module's SF SEND jack. Similarly, the SF module is enabled to receive SF signaling only when the Model 1260A's RECEIVE mode switch is at E (SF) G&B position and a patch cord is inserted in the module's SF RCV jack.

4.93 A patch cord inserted in the module's SF SEND jack disables the 1260A's E G&B send mode. The corresponding E receive mode is similarly disabled.

4.94 The SF module provides SF send levels and receive sensitivities appropriate for the line or drop direction of the test (i.e. they conform to standard 4-wire circuit TLP levels). The standard send levels and receive sensitivities are selected via the module's SEND-RCV LINE/MON/SEND-RCV DROP toggle switch as shown in Table 4—6. This switch also determines the receive impedance and configures the module for monitoring as described in Table 4—3.

4.95 SF send levels other than those fixed by the SEND-RCV LINE/MON/SEND-RCV DROP switch, are selectable via the module's DEV FR SND TLP (deviation from send test level point) control for the purpose of margin testing and similar applications. The DEV FR

SND TLP control can be set for levels up to 7 dB above fixed levels in 2-dB steps, and for levels as low as 11 dB below fixed levels in 1-dB steps.

4.96 SF SEND LEVEL AUGMENTATION

4.97 As with most SF signaling arrangements, the SF module sends pulsing at an augmented level when compared with steady state on-hook levels. Augmented levels are 12 dB above steady on-hook levels as shown in Table 4—6.

4.98 The SF module permits selection of either of two send level augmentation techniques. When shipped from the factory, the technique shown at the top of Figure 4—11 is selected via an internal switch. The send level augmentation technique shown at the bottom of Figure 4—11 can be selected by the user for applications where desired.

4.99 As shown by Figure 4—11, the available send level augmentation techniques differ only in the send level present upon returning to the steady on-hook state. The factory selected technique provides approximately 400 milliseconds of augmented level when the 1260A's ON HOOK/OFF HK + DIAL/CONT switch is returned to ON HOOK position. This technique generally speeds up the detection of steady on-hook by far-end SF receivers. A normal on-hook level follows the 400 milliseconds of augmented SF tone level.

4.100 The optional SF send level augmentation technique results in an immediate return to the normal on-hook level when the ON HOOK/OFF HK + DIAL/ CONT switch is set to ON HOOK position. The optional technique can be selected for testing of SF receivers designed to operate with this type of level augmentation.

4.101 The selected SF send level augmentation technique can be changed by modifying the settings of the module's internal DIP switch. This procedure is given in paragraph 4.109.

4.102 SF SEND/RECEIVE FREQUENCIES

4.103 As mentioned previously, the SF module is intended primarily for send/receive testing of 2600-Hz SF signaling systems. However, the module can be conditioned for use with an SF system based on other frequencies, such as 2400 Hz.

4.104 Send frequencies other than 2600 Hz can be obtained in two ways:

- ☐ Selecting a 2400-Hz send frequency via an internal DIP switch,
- ☐ Connecting an external oscillator of the desired frequency to the module's EXT OSC jack. (This disables the internal SF source.)

4.105 The internally selectable 2400-Hz output meets all the send level specifications of Table 4—6. Also, the DEV FR SND TLP control remains calibrated for 2400-Hz operation. Similarly, the same specified/ calibrated send levels are obtained at the SF SEND jack when an external source connects to the EXT OSC jack. However, the external source must meet all of the following requirements:

- ☐ Output level of 0 dBm ± 0.05 dB,
- ☐ Output impedance of 600 ohms,
- ☐ Frequency of 200 to 3500 Hz.

4.106 To change the internally generated SF send frequency from 2600 Hz to 2400 Hz (or vice versa) refer to the procedure of paragraph 4.109.

4.107 When shipped from the factory, the SF module's receiver is configured as a 2600-Hz narrow band detector (i.e. with a 2600 ± 30 Hz receive range). The receiver can also be configured as a wideband detector to permit recognition of other SF frequencies such as 2400 Hz. The nominal bandpass for wideband operation is 1.5 to 4 kHz.

Table 4—6. SF Send Levels And Receive Sensitivities

S2 POSITION (on SF module)	SEND LEVELS (dBm, ref. 600 ohms)		RECEIVE SENSITIVITIES (dBm, ref. 600 ohms)	
	STEADY ON-HOOK	PULSING	STEADY ON-HOOK	PULSING
SEND-RCV LINE	−36	−24	−15	−3
SEND-RCV DROP	−13	−1	−38	−26
MON	—	—	−38	−26

NOTE

Send levels are as specified above only when the DEV FR SND TLP control is at 0 dB position.

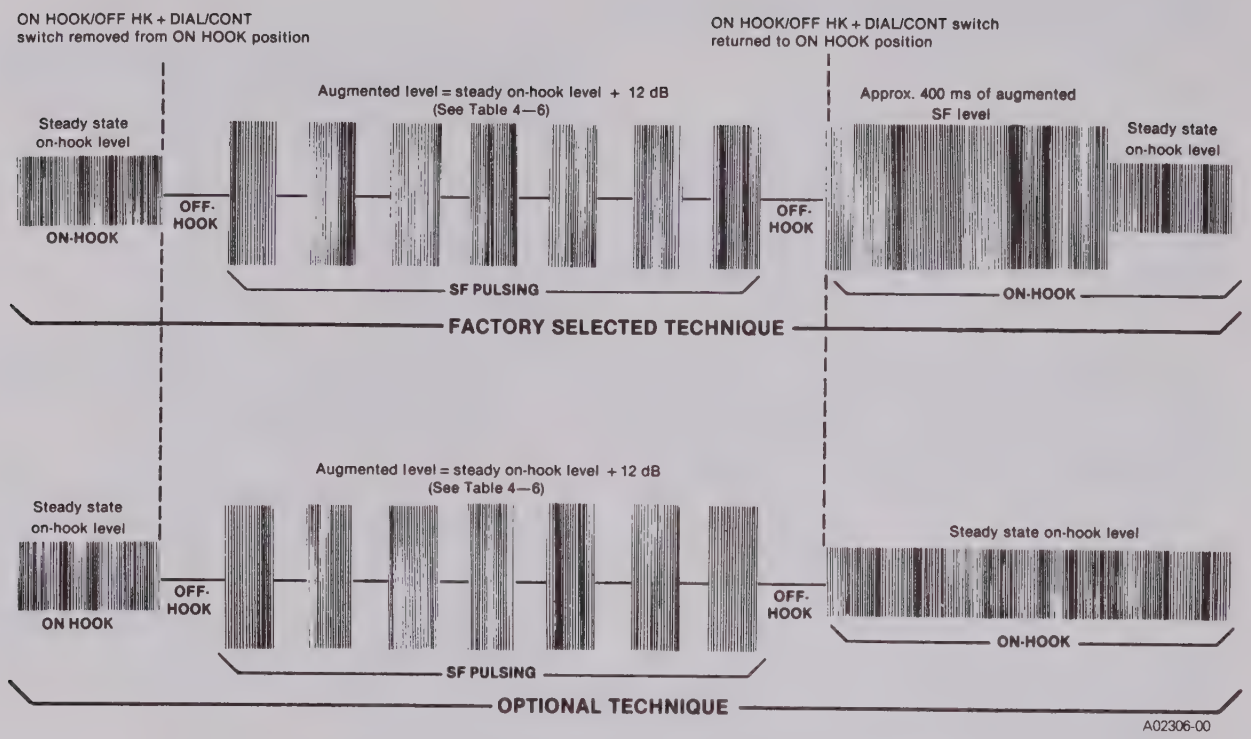
ON HOOK/OFF HK + DIAL/CONT switch removed from ON HOOK position
ON HOOK/OFF HK + DIAL/CONT switch returned to ON HOOK position
Augmented level = steady on-hook level + 12 dB (See Table 4—6)
Approx. 400 ms of augmented SF level
Steady state on-hook level
ON-HOOK
OFF-HOOK
SF PULSING
ON-HOOK
FACTORY SELECTED TECHNIQUE
Augmented level = steady on-hook level + 12 dB (See Table 4—6)
Steady state on-hook level
ON HOOK
OFF-HOOK
SF PULSING
ON-HOOK
OPTIONAL TECHNIQUE
A02306-00

Figure 4—11. SF Send Level Augmentation Techniques

NOTE

When detecting frequencies other than 2600 Hz, the receive sensitivities may deviate from those shown in Table 4—6. In addition, wideband operation may affect pulsing speed and percent break measurement accuracy.

4.108 To change the SF module from narrow band operation to wideband operation (or vice versa) modify the settings on the internal DIP switch as described in the following procedure.

4.109 SETTING THE SF MODULE INTERNAL DIP SWITCH

4.110 Any of the SF module operating modes described in paragraphs 4.96 through 4.108 can be selected by changing the settings of the module's internal DIP switch. To access and set this switch, perform the following steps.

1. If the SF module is not installed in the Model 1260A, go to step 4. Otherwise proceed with step 2.

2. Place the Model 1260A's POWER switch in OFF position.

3. Disengage the SF module's snap-lock fasteners and remove the module from the Model 1260A.

4. Locate SF module board B 97042 on the right side of the module. This is the smaller of the module's two pc boards. Note that one side of module board B is mounted on two hinges.

5. On the side of module board B **opposite** the hinges, remove two screws passing through the Plexiglas cover and module board B itself.

6. Remove two additional screws that secure the Plexiglas cover to the module front panel. Module board B with the Plexiglas cover attached should now swing outward on its hinges.

7. Refer to Figure 4—12 and locate multiple DIP switch S1 on the component side of module board B. Switch S1 may be partially obscured by a flat cable assembly.

8. Refer to Table 4—7 and set the DIP switch as desired. Use the tip of a pencil or similar object.

9. Swing module board B back into its normal position and replace the four screws removed previously.

10. Slide the SF module back into its slot in the 1260A and engage the snap-lock fasteners.

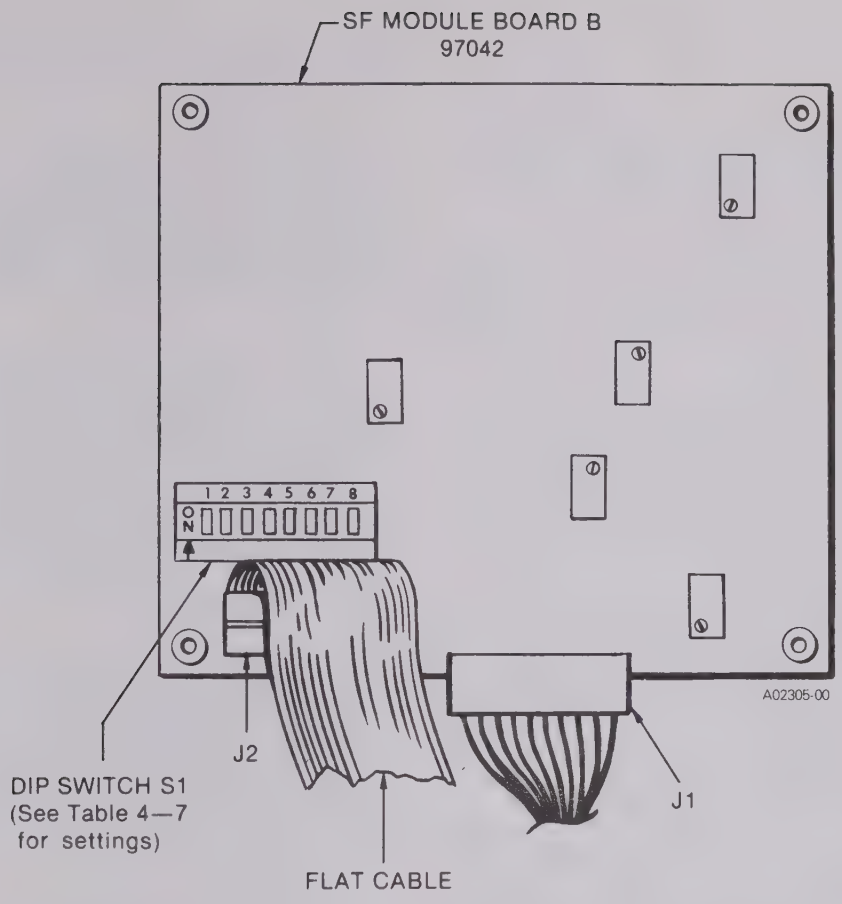

Figure 4—12. SF Module Internal DIP Switch Location Diagram

Table 4—7. SF Module Internal DIP Switch Settings

S1 SWITCH CONTACTS	ON POSITION (closed)	OFF POSITION (open)
S1-1 and S1-2	Select 2600-Hz send frequency*	Select 2400-Hz send frequency
S1-3	Selects the send level augmentation technique shown at the bottom of Figure 4—11	Selects the send level augmentation technique shown at the top of Figure 4—11*
S1-6 and S1-7	Select wideband (1.5 to 4 kHz) SF receiver	Select narrow band (2600 ± 30 Hz) SF receiver*

NOTES

1. S1-4 must always be closed.
2. S1-5 and S1-8 are not used.

*Denotes factory settings.

4.111 DIAGNOSIS OF COMMON PULSING PROBLEMS

4.112 The Model 1260A can be used to quickly isolate a number of common pulsing problems including:

- ☐ High/low percent break,
- ☐ Split pulsing,
- ☐ Irregular pulsing conditions (such as slow first pulsing).

4.113 High/low percent break problems often stem from defective or misaligned pulsing senders, receivers, correctors, and repeaters. In addition, high percent break can be caused by excessive leakage on the line, while low percent break can result from excessive loop resistance.

4.114 The instrument's average percent break display provides an immediate indication of a high/low percent break condition. The display is automatically updated for each ten-pulse group or non-one digit received.

4.115 Split pulsing usually results from either excessive contact bounce, line oscillations, or both. The 1260A can reveal split pulsing in two ways:

- ☐ By displaying a total pulse count exceeding the number sent,
- ☐ By displaying one or more individual digits having values greater than those sent.

4.116 For example, a string of 5 pulses comprising a digit 5, after undergoing split pulsing, could generate a total pulse count of 7 and be displayed as a digit 7.

4.117 The invalid pulses that are "split off" from valid pulses can be detected over a wide range of pulse widths. When shipped from the factory, a minimum detectable pulse width of 12.8 milliseconds is internally selected. Other selections are available as described in paragraph 4.77.

4.118 Slow (or short) first pulsing is often the consequence of a significant difference between the static and dynamic characteristics of electromechanical pulse signaling equipment. This problem and other irregular pulsing conditions are not easily detected by an average percent break measurement. To help in diagnosing such problems, the Model 1260A provides a minimum/maximum pulsing speed and percent break measurement data upon demand.

4.119 The minimum display shows the slowest pulsing speed and lowest percent break measured since last reset of Model 1260A. (An abnormal minimum percent break reading denotes a possible slow first pulse problem.) The maximum display shows the fastest pulsing speed and highest percent break measured since last reset of Model 1260A.

SECTION 5

APPLICATION PROCEDURES

5.1 This section gives step-by-step procedures for send/receive testing on a wide variety of loop, E&M, and SF circuits. Test configuration drawings are included to show the interface presented by the Model 1260A under various conditions.

5.2 PREPARATORY INFORMATION

5.3 With the exception of monitoring "live" signaling on in-service circuits, most pulse testing involves taking the line under test out of service. Thus, the Model 1260A has built-in busy indicators that permit verification of idle condition before removing a line from service. For convenience, the appropriate idle/busy status check is included with each test procedure given in this section.

5.4 The actual method used for accessing a line to be tested, checking for busy, and then removing from service depends on the type of appearances available. When testing E&M circuits, connecting to a standard E&M jackfield as shown on Figure 5—1 is an efficient way to achieve the following.

- ☐ Monitoring the line without interrupting service and checking for busy. (This is accomplished by through-connecting the Model 1260A's E&M LINE and DROP jacks as shown on Figure 5—1.)
- ☐ Making high impedance bridging measurements under in-service conditions.
- ☐ Breaking the circuit and testing toward line or drop.
- ☐ Sending off-hook supervision in the direction opposite to the direction of the test (reverse supervision) in order to busy out the line.

5.5 When testing loop and SF circuits, the required connections can be easily obtained via jackfields commonly used in many offices. (See Figure 5—2.) These jackfields permit both in-service monitoring and breaking the line to test toward line or drop.

5.6 In some loop testing applications it may be desirable to busy out the line under test via a sleeve lead ground. This can be accomplished by connecting the sleeve lead to the 1260A's front panel ground lug.

5.7 MODEL 1260A APPLICATIONS

5.8 As shown by Table 5—1, the 1260A has four basic send modes and four basic receive modes. However, the total number of pulse testing tasks that can be performed by the instrument far exceeds eight since:

- ☐ Two or more test configurations are possible for each mode,
- ☐ Any send mode can be combined with any receive mode when simultaneous send and receive testing is desired. Mixed operating modes are extremely useful for input-to-output testing of signaling repeaters, translators, and converters.

5.9 Test configuration drawings are given where appropriate in this section to show the interface presented by the instrument in various operating modes. Included are drawings for some of the many possible combined send/receive modes.

5.10 Before attempting any send or receive test, refer to the application guide of Table 5—1 for the correct procedure. If a combined send and receive test is desired, perform the steps for the appropriate send procedure first and then follow the appropriate receive procedure.

5.11 SEND PROCEDURES

5.12 SENDING DRY OR WET LOOP PULSING

5.13 To send dry loop (contact) pulsing or wet loop (battery and ground) pulsing, perform the following steps.

1. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; and then place POWER switch at ON position. Power indicator on switch should light.

2. If line to be tested is now in service, check idle/busy status according to steps 3 through 8 below. Otherwise proceed directly to step 9.

3. Set E&M/LOOP switch to BRDG WET position.

4. Set the RECEIVE mode switch to WET LOOP position.

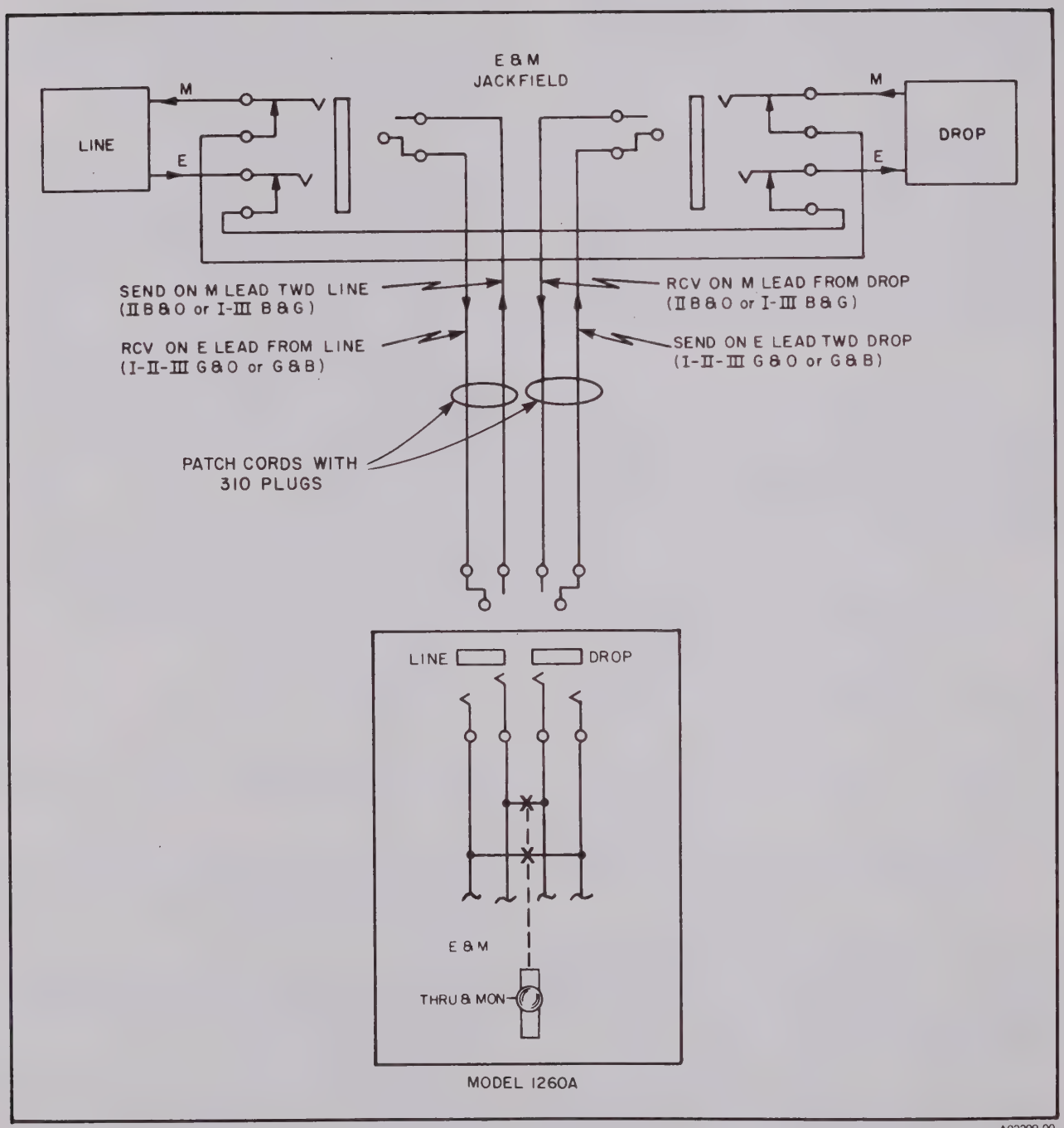

Figure 5—1. Model 1260A Interfacing With An E&M Jackfield

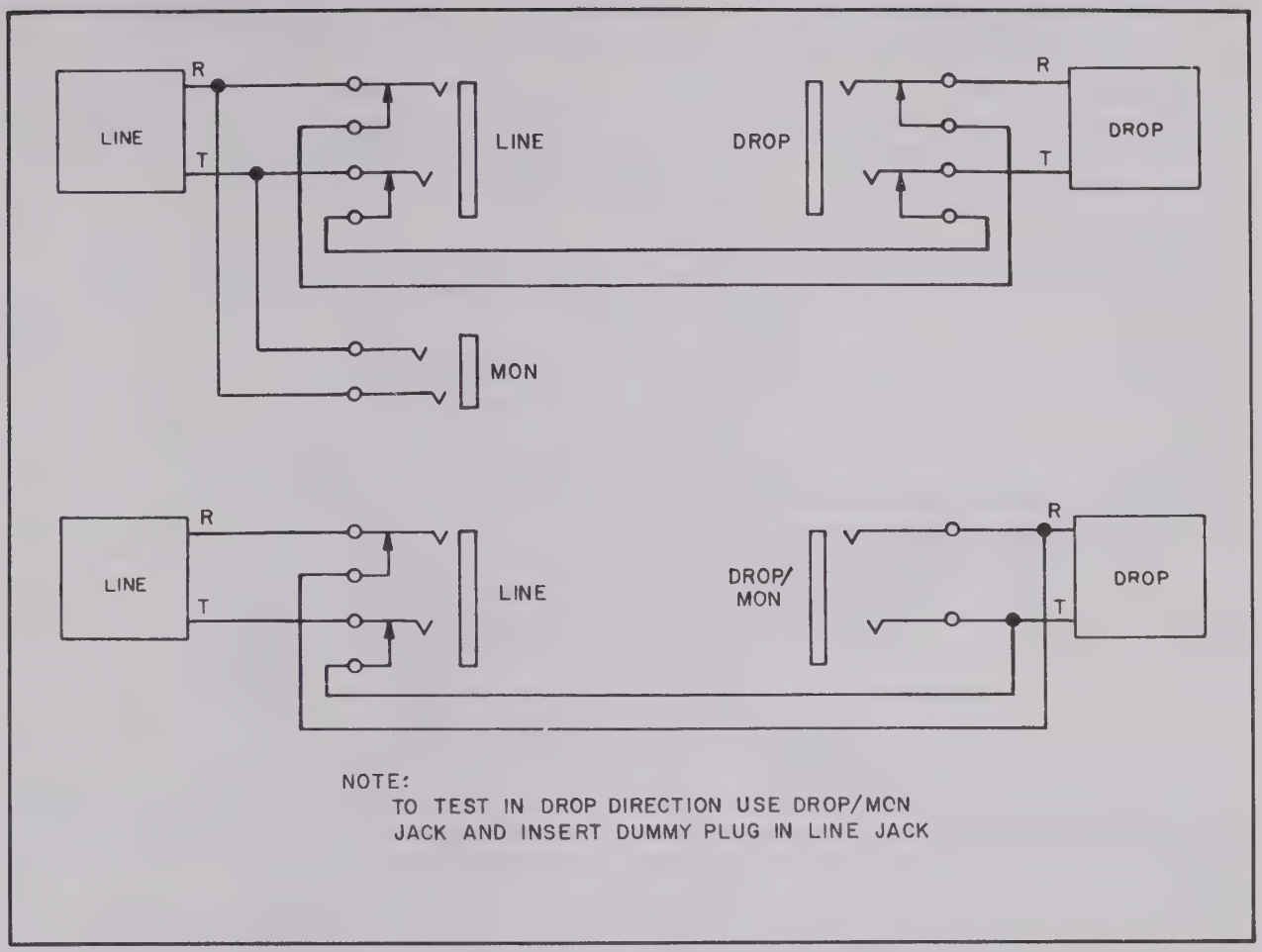

Figure 5—2. Jackfields For Convenient Loop/SF Testing

5. Using a suitable path cord, connect the instrument's LOOP RCV jack to a convenient monitor point on the line under test. Use of an office monitor jack similar to those shown on Figure 5—2 is recommended.

6. The 1260A analog panel meter should now show the line's idle/busy status (ON HK idicates idle, OFF HK indicates busy). If the line under test includes a sleeve lead, the SLEEVE GND lamp lights to indicate busy (i.e. sleeve lead at ground potential).

7. If the line under test is found to be idle, it can be taken out of service and tested as described in the following steps. In some applications, it may be desirable to busy out the line by connecting its sleeve lead to the instrument's front panel GND lug.

8. Remove patch cord from the 1260A's LOOP RCV jack.

9. If sending dry loop (contact) pulsing, set the SEND mode switch to DRY LOOP. If sending wet loop (battery and ground) pulsing, set SEND mode switch to WET LOOP. Figure 5—3 shows the 1260A configured to send dry loop pulsing. When sending wet loop pulsing, the instrument is configured as shown in Figure 5—4.

10. Set ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK. The SEND lamp should light.

11. Using a suitable patch cord, connect the line under test to the instrument's LOOP SEND jack. Use of an office line or drop jack (as required) similar to those shown on Figure 5—2 is recommended. Such a connection will break the line thereby removing it from service.

12. Condition the loop via the LOOP RES and LINE LEAK pushbuttons as required. If necessary, refer to paragraph 4.35 for assistance.

SEND PROCEDURES	
APPLICATION	**PARAGRAPH**
Sending wet loop (battery and ground) or dry loop pulsing	5.12
Sending on E lead toward drop	5.14
Sending on M lead toward line	5.16
Sending SF toward line or drop	5.18

RECEIVE PROCEDURES	
APPLICATION	**PARAGRAPH**
Receiving wet loop (battery and ground) or dry loop pulsing	5.21
Receiving on E lead from line	5.31
Receiving on M lead from drop	5.33
Receiving SF from line or drop	5.35

Any send procedure can be combined with any receive procedure. To perform simultaneous send/receive testing, follow the appropriate send procedure first and then follow the appropriate receive procedure.

Table 5—1. Model 1260A Application Guide

13. Select the desired pulsing speed, percent break and interdigit time with the SEND thumbwheel switches. If necessary, refer to paragraph 4.20 for assistance.

14. If dialing from memory is desired, load the instrument's dialer memory as described in paragraph 4.31.

15. If the Model 1260A is to be used both as a sender and a receiver, proceed directly to the appropriate receive procedure listed in Table 5—1. Begin with step 3. (The actions necessary to initiate the sending of off-hook supervision and pulsing are given in that procedure as well as in the steps below.) If the Model 1260A is to be used as a sender only, proceed to step 16.

16. To send a steady off-hook signal, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

17. To send digits in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

18. To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

19. To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. This action initiates the sending of a continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

5.14 SENDING ON E LEAD TOWARD DROP

5.15 To send E lead pulsing in the drop direction, perform the following steps.

1. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; and then place POWER switch at ON position. Power indicator on switch should light.

2. If the E&M circuit to be tested is now in service, set E&M/LOOP switch to THRU & MON. Otherwise omit this step.

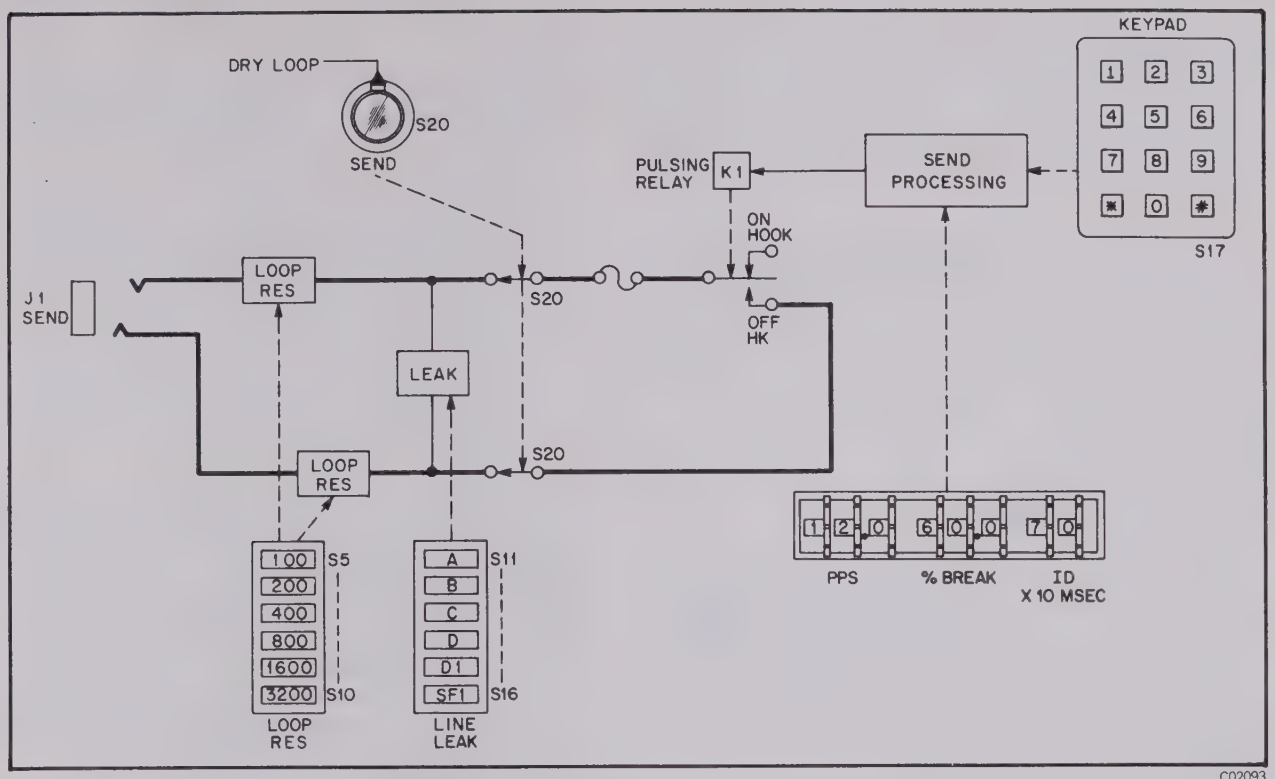

Figure 5—3. Sending Dry Loop Pulsing

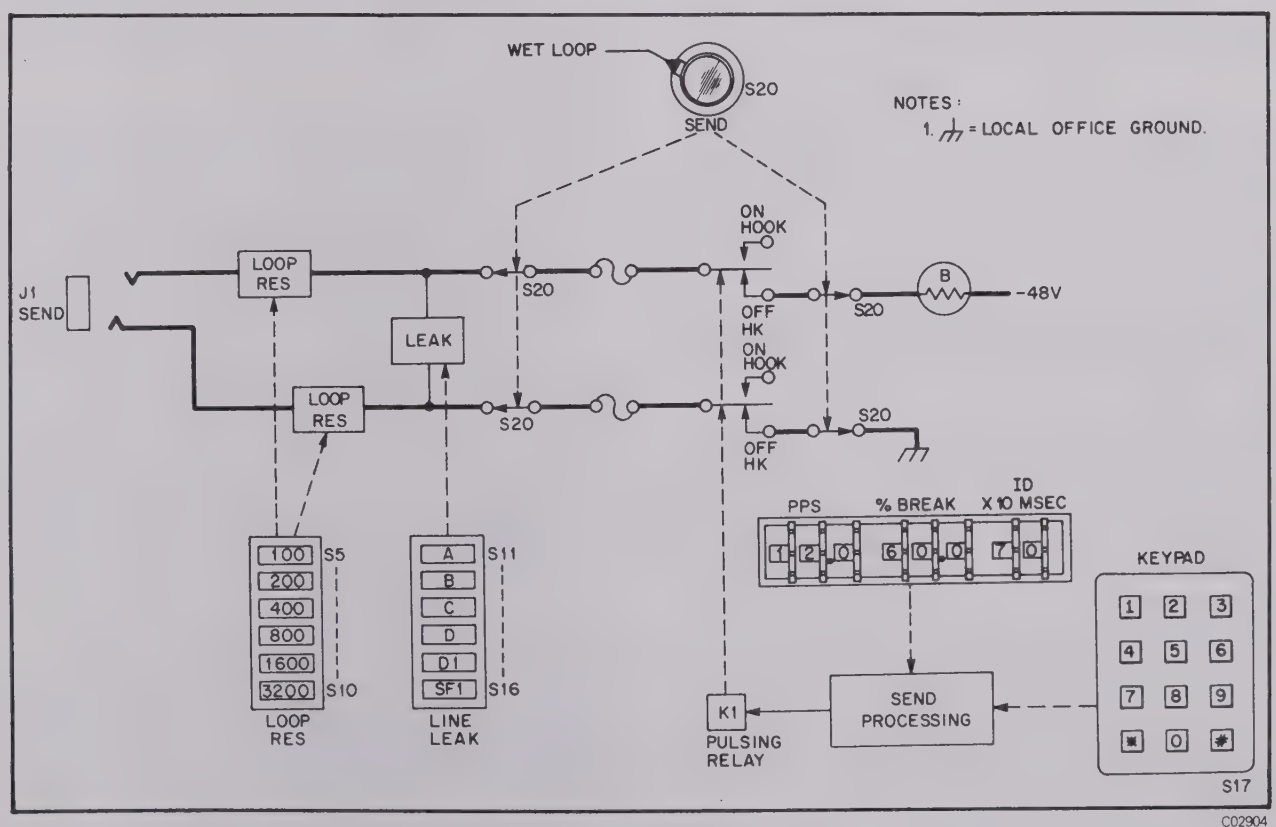

Figure 5—4. Sending Wet Loop Pulsing

3. If the E&M circuit to be tested is now in service, interconnect the circuit with the Model 1260A as described in step (a) below. Step (a) permits checking for idle without interrupting service. If the circuit under test is already removed from service, make the connections of step (b).

(a) Establish a monitoring connection with the circuit to be tested via an office E&M jackfield (or similar means) as shown in Figure 5—1. To ensure service is not momentarily interrupted, connect to the 1260A's E&M LINE and DROP jacks first, and then connect to the jackfield using a WECO 338A (or equivalent) twin-plug.

After performing step 3 (a) above, omit step 3 (b) and proceed directly to step 4.

(b) Using a suitable patch cord, connect the Model 1260A's E&M DROP jack to the drop jack of an office E&M jackfield as shown in Figure 5—1. Connect the 1260A's E&M LINE jack to the office jackfield line jack only if it is desired to busy out the far end of the circuit by sending an M lead off-hook signal (battery). If the office is not equipped with an E&M jackfield, use most convenient method to achieve required connections.

After performing step 3 (b) above, omit steps 4 and 5 by proceeding directly to step 6.

4. Observe the instrument's E&M indicator lamps. If the E lamp is extinguished, circuit is seized at far end (i.e. E lead is at ground potential). If the M lamp is extinguished, circuit is seized at the near end (i.e. M lead is at battery potential). If both lamps are lighted, circuit is idle.

5. If the E&M circuit under test is found to be idle, it can be removed from service and tested as described in the following steps.

6. Set the SEND mode switch to E I-II-III G&O position if ground and open E lead pulsing is desired. (This is normally the method of E lead pulsing employed by E&M Types I, II, and III.) Set the SEND mode switch to E (SF) G&B position if ground and battery E lead pulsing is desired.

7. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK. The send lamp should light.

8. Set the E&M/LOOP switch to either SEND-RCV position.

NOTE

If instrument is to receive on a loop basis while sending on the E lead, set the E&M/LOOP switch as follows.

- ☐ Place E&M/LOOP switch in top SEND-RCV position to select a 400-ohm resistive termination for the loop pulsing measurement while sending on the E lead.
- ☐ Place E&M/LOOP switch in bottom SEND-RCV position to select an A-relay termination for the loop pulsing measurement while sending on the E lead.

9. The instrument is now configured for sending on the E lead as shown in Figure 5—5. The line-to-drop continuity of the circuit is broken thereby removing the circuit from service (if not removed previously). Also, if a patch cord was inserted in the E&M LINE jack in step 3 above, an M lead off-hook signal (battery) is sent in the line direction to busy out the far end of the circuit. If the reverse direction busy signal is not desired, remove the patch cord from the E&M LINE jack.

10. Select the desired pulsing speed, percent break and interdigit time with the SEND thumbwheel switches. If necessary, refer to paragraph 4.20 for assistance.

11. If dialing from memory is desired, load the instrument's dialer memory as described in paragraph 4.31.

12. If the Model 1260A is to be used both as a sender and a receiver, proceed directly to the appropriate receive procedure listed in Table 5—1. Begin with step 3. (The actions necessary to initiate the sending of off-hook supervision and pulsing are given in that procedure as well as in the steps below.) If the Model 1260A is to be used as a sender only, proceed to step 13.

13. To send a steady E lead off-hook signal (ground) in the drop direction, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

14. To send digits towards the drop in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits

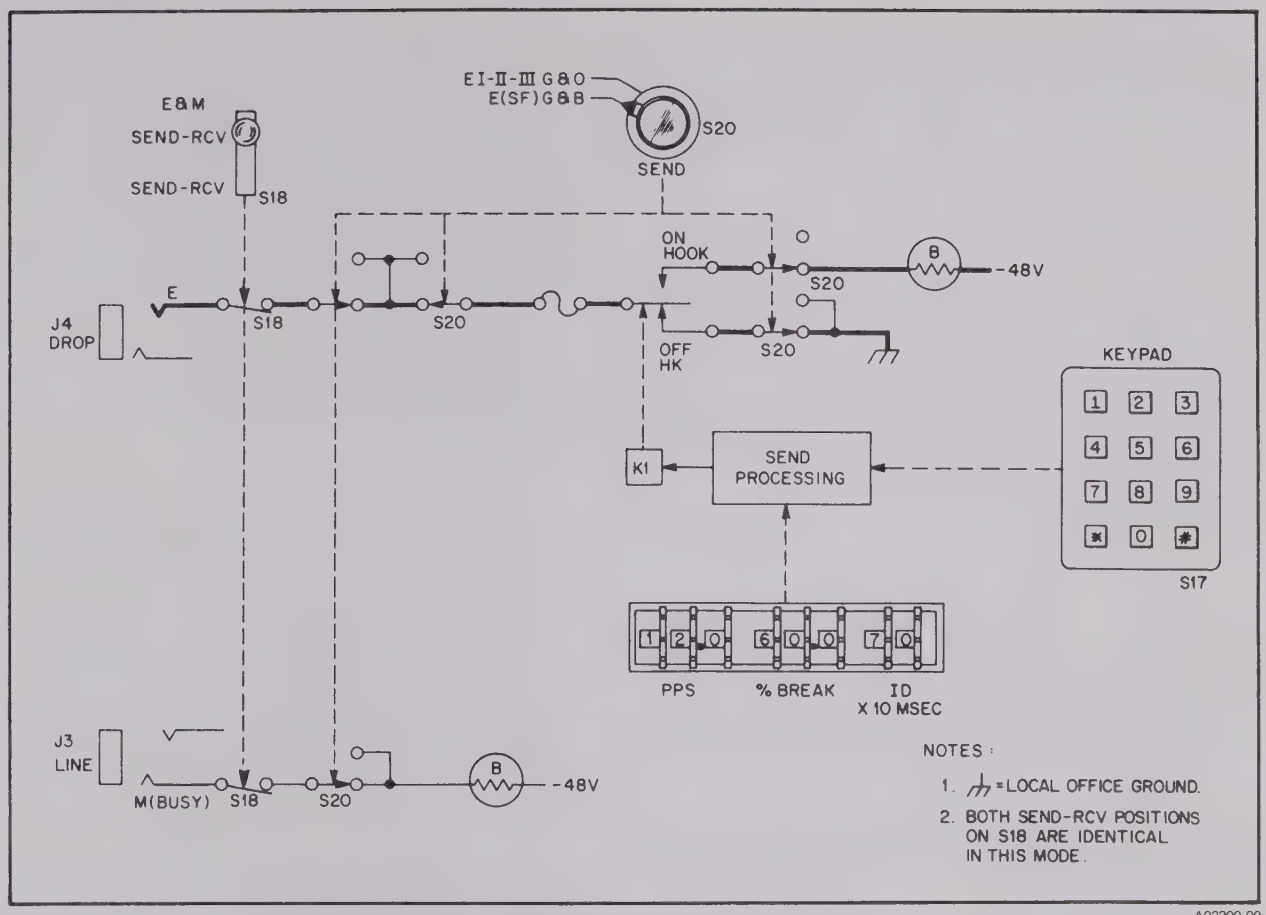

Figure 5—5. Sending On E Lead Toward Drop

are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

15. To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

16. To send a continuous stream of pulses toward the drop, set the ON HOOK/OFF HK + DIAL/CONT-switch to CONT. This action initiates the sending of a continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

5.16 SENDING ON M LEAD TOWARD LINE

5.17 To send M lead pulsing in the line direction, perform the following steps.

1. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; and then place POWER switch at ON position. Power indicator on switch should light.

2. If the E&M circuit to be tested is now in service, set E&M/LOOP switch to THRU & MON. Otherwise omit this step.

3. If the E&M circuit to be tested is now in service, interconnect the circuit with the Model 1260A as described in step (a) below. Step (a) permits checking for idle without interrupting service. If the circuit under test is already removed from service, make the connections of step (b).

(a) Establish a monitoring connection with the circuit to be tested via an office E&M jackfield (or similar

means) as shown in Figure 5—1. To ensure service is not momentarily interrupted, connect to the 1260A's E&M LINE and DROP jacks first, and then connect to the jackfield using a WECO 338A (or equivalent) twin-plug.

After performing step 3 (a) above, omit step 3 (b) and proceed directly to step 4.

(b) Using a suitable patch cord, connect the Model 1260A's E&M LINE jack to the line jack of an office E&M jackfield as shown in Figure 5—1. Connect the 1260A's E&M DROP jack to the office jackfield drop jack only if it is desired to busy out the near end of the circuit by sending an E lead off-hook signal (ground). If the office is not equipped with an E&M jackfield, use most convenient method to achieve required connections.

After performing step 3 (b) above, omit steps 4 and 5 by proceeding directly to step 6.

4. Observe the instrument's E&M indicator lamps. If the E lamp is extinguished, circuit is seized at far end (i.e. E lead is at ground potential). If the M lamp is extinguished, circuit is seized at the near end (i.e. M lead is at battery potential). If both lamps are lighted, circuit is idle.

5. If the E&M circuit under test is found to be idle, it can be removed from service and tested as described in the following steps.

6. Set the SEND mode switch to M II B&O position if battery and open pulsing is desired. (This is normally the method of M lead pulsing employed by E&M Type II signaling.) Set the SEND mode switch to M I-III B&G positon if battery and ground M lead pulsing is desired. (This is normally the method of M lead pulsing employed by E&M Types I and III.)

7. Set the ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK. The SEND lamp should light.

8. Set the E&M/LOOP switch to either SEND-RCV position.

NOTE

If instrument is to receive on a loop basis while sending on the M lead, set the E&M/LOOP switch as follows.

- ☐ Place E&M/LOOP switch in top SEND-RCV position to select a 400-ohm resistive termination for the loop pulsing measurement while sending on the M lead.
- ☐ Place E&M/LOOP switch in bottom SEND-RCV position to select an A-relay termination for the loop pulsing measurement while sending on the M lead.

9. The instrument is now configured for sending on the M lead as shown in Figure 5—6. The line-to-drop continuity of the circuit is broken thereby removing the circuit from service (if not removed previously). Also, if a patch cord was inserted in the E&M DROP jack in step 3 above, an E lead off-hook signal (ground) is sent in the drop direction to busy out the near end of the circuit. If the reverse direction busy signal is not desired, remove the patch cord from the E&M DROP jack.

10. Select the desired pulsing speed, percent break and interdigit time with the SEND thumbwheel switches. If necessary, refer to paragraph 4.20 for assistance.

11. If dialing from memory is desired, load the instrument's dialer memory as described in paragraph 4.31.

12. If the Model 1260A is to be used as both a sender and a receiver, proceed directly to the appropriate receive procedure listed in Table 5—1. Begin with step 3. (The actions necessary to initiate the sending of off-hook supervision and pulsing are given in that procedure as well as in the steps below.) If the Model 1260A is to be used as a sender only, proceed to step 13.

13. To send a steady M lead off-hook signal (battery) in the line direction, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

14. To send digits toward the line in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

15. To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

16. To send a continuous stream of pulses toward the line, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. This action initiates the sending of a

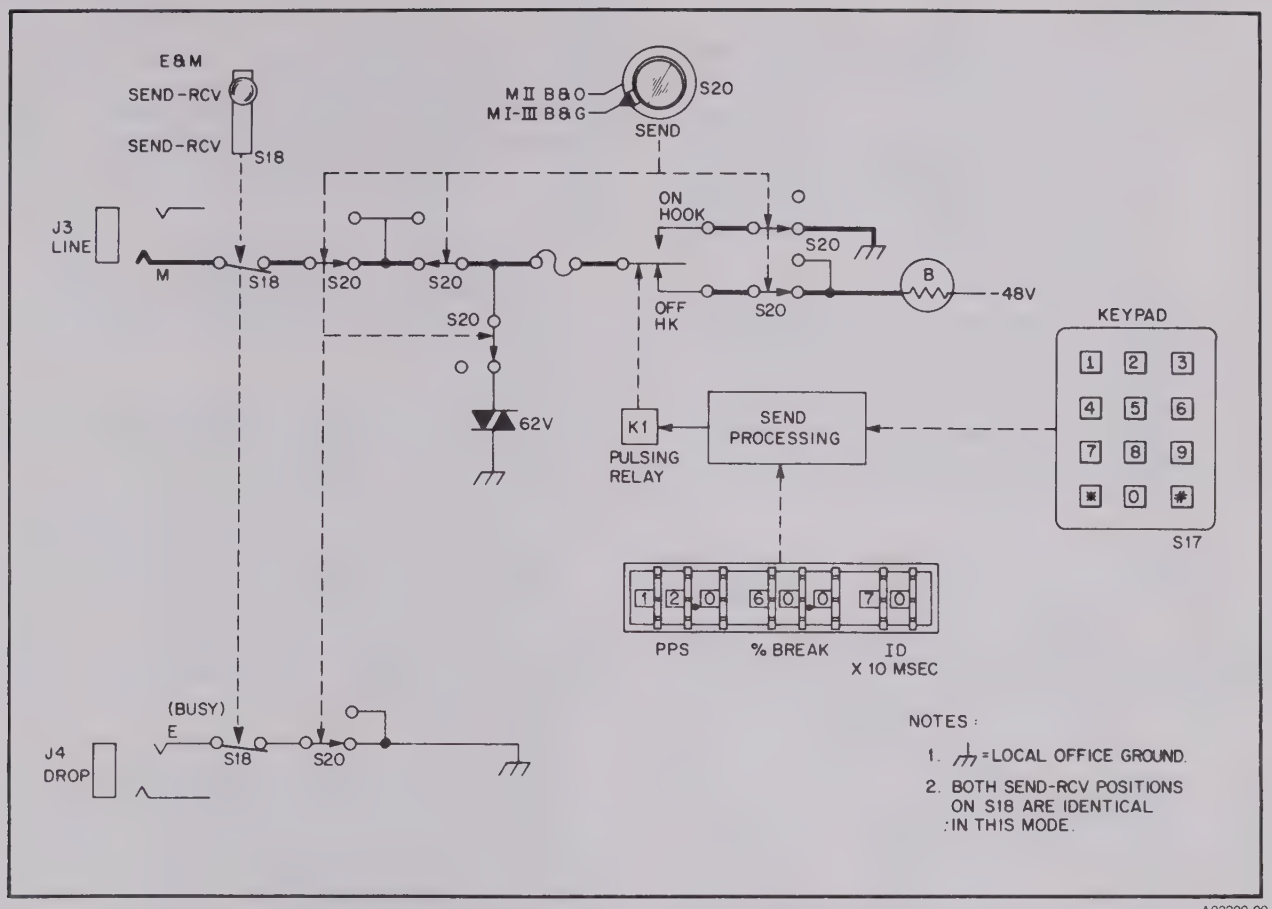

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Figure 5—6. Sending On The M Lead Toward The Line

continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

5.18 SENDING SF SIGNALING

5.19 To send SF signaling toward either line or drop, perform the following steps.

NOTE

For SF signaling applications, the Model 1260A must be equipped with the optional SF module.

1. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; then place POWER switch in ON position. Power indicator on switch should light.

2. If the SF circuit to be tested is now in service, check idle/busy status according to steps 3 through 9 below. Otherwise, proceed directly to step 10.

3. On the SF module, set the SEND-RCV LINE/MON/SEND-RCV DROP switch to MON position.

4. Using a suitable patch cord, connect the module's SF RCV jack to a convenient monitor point on the send leg (i.e. the outgoing pair to the distant office) of the circuit under test. Use of an office monitor jack similar to those shown on Figure 5—2 is recommended.

NOTE

If office line and drop jacks similar to those shown in Figure 5—2 are available but a monitor jack is not, the line (either pair) can be monitored without disturbing service as follows:

- ☐ Set the SF module's SEND-RCV LINE/MON/SEND-RCV DROP switch to MON position. This action thru-connects the module's SF SEND and SF RCV jacks as shown in Figure 5—7.

☐ Patch the SF SEND jack to one side (line or drop) of the pair to be monitored and patch the SF RCV jack to the other side. To ensure service is not momentarily interrupted, connect to both SF module jacks first and then connect to the office line and drop jacks using a WECO 338A (or equivalent) twin-plug.

5. Observe the SF module's CKT IDLE lamp. If the lamp is lighted (indicating the presence of continuous SF tone), the SF circuit is idle at the near end.

6. Disconnect the module's SF RCV jack from the send leg of the circuit under test and reconnect to a monitor point on the receive leg.

7. If the CKT IDLE lamp is now lit, the SF circuit is idle at the far end.

8. If the SF circuit under test is found to be idle at both ends, it may be removed from service and tested as described in the following steps.

9. Remove the patch cord from the SF RCV jack.

10. On the Model 1260A, set the SEND mode switch to E (SF) G&B position.

11. Set the Model 1260A's ON HOOK/OFF HK + DIAL/CONT switch to ON HOOK position. The instrument's SEND lamp should light.

12. On the SF module, set the SEND-RCV LINE/MON/SEND-RCV DROP switch to the SEND-RCV position corresponding to the direction of the test. This switch selects the appropriate SF send levels as shown in Table 4—6. The instrument is now configured for sending SF signaling as shown on Figure 5—7.

13. If the normal SF send levels of Table 4—6 are desired, set the module's DEV FR SND TLP (deviation from send test level point) control to 0 dB position. If other send levels are desired, set the DEV FR SND TLP control accordingly. Levels up to 7 dB above the fixed send levels of Table 4—6 can be selected in 2 dB steps, and levels as low as 11 dB below fixed levels can be selected in 1 dB steps.

NOTE

Selecting various send levels via the DEV FR SND TLP control is useful for margin testing and testing at other TLP levels.

14. If SF signaling is to be sent in the line direction, connect the module's SF SEND jack to the send leg (i.e. the outgoing pair to the distant office) of the circuit under test using a suitable patch cord. If SF signaling is to be sent in the drop direction, connect the SF send jack to the receive leg of the circuit under test. Use of an office line or drop jack (as appropriate) similar to those shown on Figure 5—2 is recommended. Such a connection will break the line thereby removing it from service.

15. Select the desired pulsing speed, percent break and interdigit time with the SEND thumbwheel switches. If necessary, refer to paragraph 4.20 for assistance.

16. If dialing from memory is desired, load the instrument's dialer memory as described in paragraph 4.31.

17. If the Model 1260A is to be used both as a sender and a receiver, proceed directly to the appropriate receive procedure listed in Table 5—1. Begin with step 3. (The actions necessary to initiate the sending of off-hook supervision and pulsing are given in that procedure as well as in the steps below.) If the Model 1260A is to be used as a sender only, proceed to step 18.

18. To send a steady off-hook signal set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

19. To send digits in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

20. To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

21. To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. This action initiates the sending of a continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

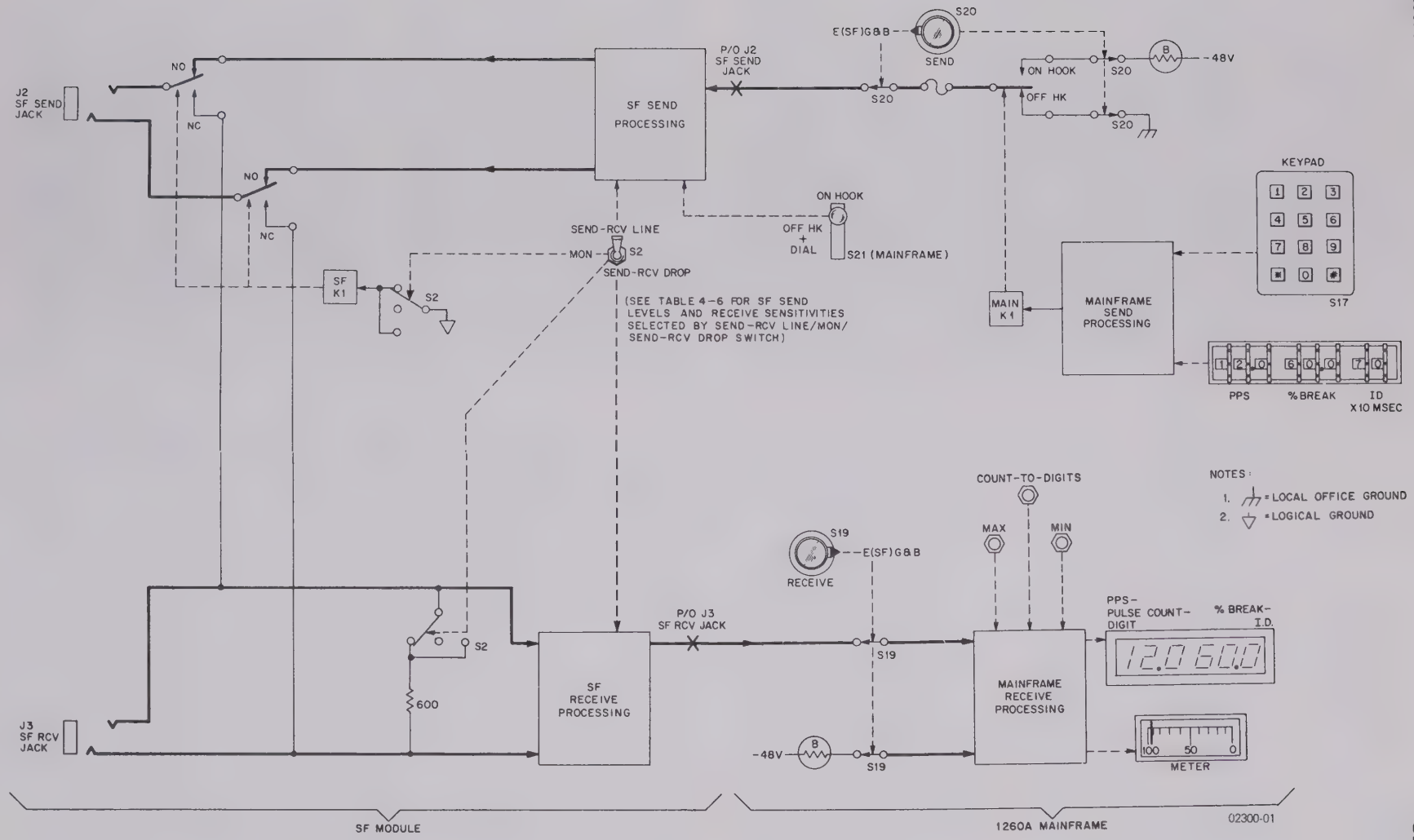

Figure 5—7. Sending/Receiving SF Signaling

5.20 RECEIVE PROCEDURES

5.21 RECEIVING DRY LOOP OR WET LOOP PULSING

5.22 Before attempting to measure loop pulsing, consideration must be given as to the appropriate termination/receive impedance for the test. Any one of three terminations are available via the 1260A's E&M/LOOP key switch:

- ☐ A 400-ohm resistive termination (TERM position),
- ☐ A bridging impedance exceeding 20 kohms (BRDG WET position),
- ☐ An incoming selector A-relay (A-RELAY position).

5.23 The **TERM** position can be used to substitute for a loop's normal in-service termination provided the loop is short (less than approximately 1 mile or 250 ohms). Configuring a test in this manner, provides sufficient pulsing speed and percent break measurement accuracy for tuning/adjusting the sending relay or equipment. Use of the TERM position requires removing the line under test from service.

5.24 The TERM position should be selected anytime it is desired to obtain the same readings as provided by a Northeast Electronics Model TTS 26B Pulse Signaling Test Set. The TTS 26B is specified by many pulse testing practices.

5.25 When the TERM position is selected, the 1260A maintains its pulsing speed and percent break measurement accuracy even in the presence of contact protection networks; up to 2 microfarads and 600 ohms. This often eliminates the need for unsoldering such networks in order to obtain accurate measurement results.

5.26 The high impedance provided by the **BRDG WET** position permits bridging measurements on an in-service circuit. This capability is especially useful for troubleshooting problems observed only while the loop is in service, and when sufficient access points are not available to remove a circuit from service for a terminated measurement.

5.27 The BRDG WET position is intended primarily for use on short loops (less than approximately one mile or 250 ohms). However, use on loops up to 1500 ohms long is possible for comparison testing. That is, the measurement results obtained on a long loop under test can be compared with results obtained from a loop of the same length known to be in satisfactory condition.

NOTE

The Model 1260A cannot be configured for bridging dry loops.

5.28 The **A-RELAY** position configures the instrument to make pulsing measurements via a built-in A relay as shown in Figure 4—9. This is the specified termination of many pulse testing practices. The test A-relay can be selected anytime it is desired to substitute for a line's normal in-service A-relay termination. Use of the A-RELAY position requires removing the line under test from service.

5.29 The instrument's A-relay termination can be used on both short and long loops (up to 1500 ohms maximum).

5.30 *Loop Receive Procedure.* To measure dry loop (contact) pulsing or wet loop (battery and ground) pulsing, perform the following steps.

1. If the Model 1260A is to be used both as a sender and a receiver, follow the appropriate send procedure listed in Table 5—1 **first**. Then resume this procedure with step 3 below.

2. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; and then place POWER switch at ON position. Power indicator on switch should light.

3. Determine if a terminated or bridging measurement is required. If necessary, refer to paragraphs 5.22 through 5.29 for assistance in making this determination.

4. If a terminated measurement is to be made on a line now in service, check idle/busy status according to steps 5 through 10 below. Otherwise, proceed directly to step 11.

5. Set E&M/LOOP switch to BRDG WET position.

6. Set the RECEIVE mode switch to WET LOOP position.

7. Using a suitable patch cord, connect the instrument's LOOP RCV jack to a convenient monitor point on the line under test. Use of an office monitor jack similar to those shown on Figure 5—2 is recommended.

8. The 1260A analog panel meter should now show the line's idle/busy status (ON HK indicates idle, OFF

HK indicates busy). If the line under test includes a sleeve lead, the SLEEVE GND lamp lights to indicate busy (i.e. sleeve lead at ground potential).

9. If the line under test is found to be idle, it can be taken out of service for a terminated measurement as described below. In some applications, it may be desirable to busy out the line by connecting its sleeve lead to the instrument's front panel GND lug.

10. Remove the patch cord from the office monitor point.

11. Observe the recommendations of paragraphs 5.22 through 5.29 and select the desired termination/receive impedance via the E&M/LOOP switch. TERM position selects a 400-ohm resistive termination; BRDG WET position selects a bridging impedance exceeding 20 kohms for measurements on wet loops only; A-relay position selects an internal A-relay termination.

12. Set the RECEIVE mode switch to either DRY LOOP or WET LOOP position as appropriate for the line under test. DRY LOOP position configures the instrument to measure pulsing from dry contacts; WET LOOP position configures the instrument to measure battery and ground pulsing. (If the A-relay termination was selected in step 11, either loop receive mode can be selected.)

Figure 5—8 shows the instrument configured for measuring dry loop pulsing, while Figure 5—9 shows the wet loop configuration. If the A-relay termination was selected in step 11, the instrument is configured as shown in Figure 5—10 for both dry loop and wet loop modes.

13. If a terminated measurement is to be made, patch the 1260A's LOOP RCV jack to the line under test via an office line or drop jack (as appropriate) similar to those shown in Figure 5—2. Such a connection will break the line and remove the normal in-service termination.

If a bridging measurement is to be made, patch the 1260A's LOOP RCV jack to a convenient monitor point on the line under test. Use of an office monitor jack similar to those shown in Figure 5—2 is recommended. This connection does not interrupt service.

14. Clear the display (even if no digits are being displayed) by engaging both the MIN and MAX pushbuttons simultaneously. The 1260A is now ready to receive and measure pulsing.

15. If necessary, initiate the sending of the pulse signaling to be measured. If the 1260A is to be the source of the test signal, perform step 16 below. Otherwise, proceed directly to step 17.

16. To send the required supervision/pulsing via the 1260A, perform the following actions.

NOTE

This step assumes the instrument has been properly configured for sending supervision/pulsing according to the appropriate send procedure listed in Table 5—1.

- ☐ To send a steady off-hook signal, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

- ☐ To send digits in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

- ☐ To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

- ☐ To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. This action initiates the sending of a continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

17. Pulsing measurement results can now be obtained from the 1260A. If necessary, refer to paragraph 4.45 for assistance in reading the digital readout. Also, the analog panel meter provides an indication of instantaneous percent break and on-hook/off-hook status on the line under test. The meter is especially useful for observation of short-term variations in received percent break.

18. If desired, use the METER ADJ control to set the analog meter to agree with the digital readout.

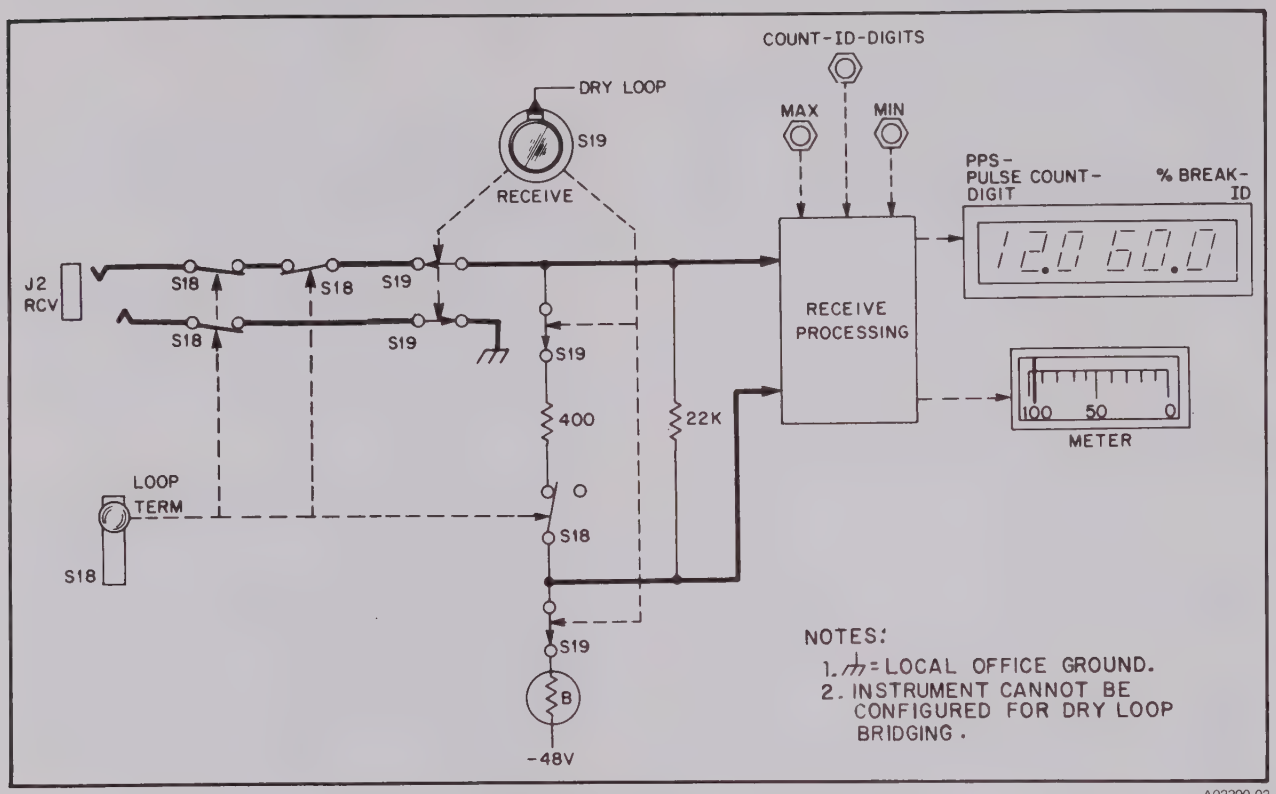

Figure 5—8. Receiving On Dry Loop (terminated)

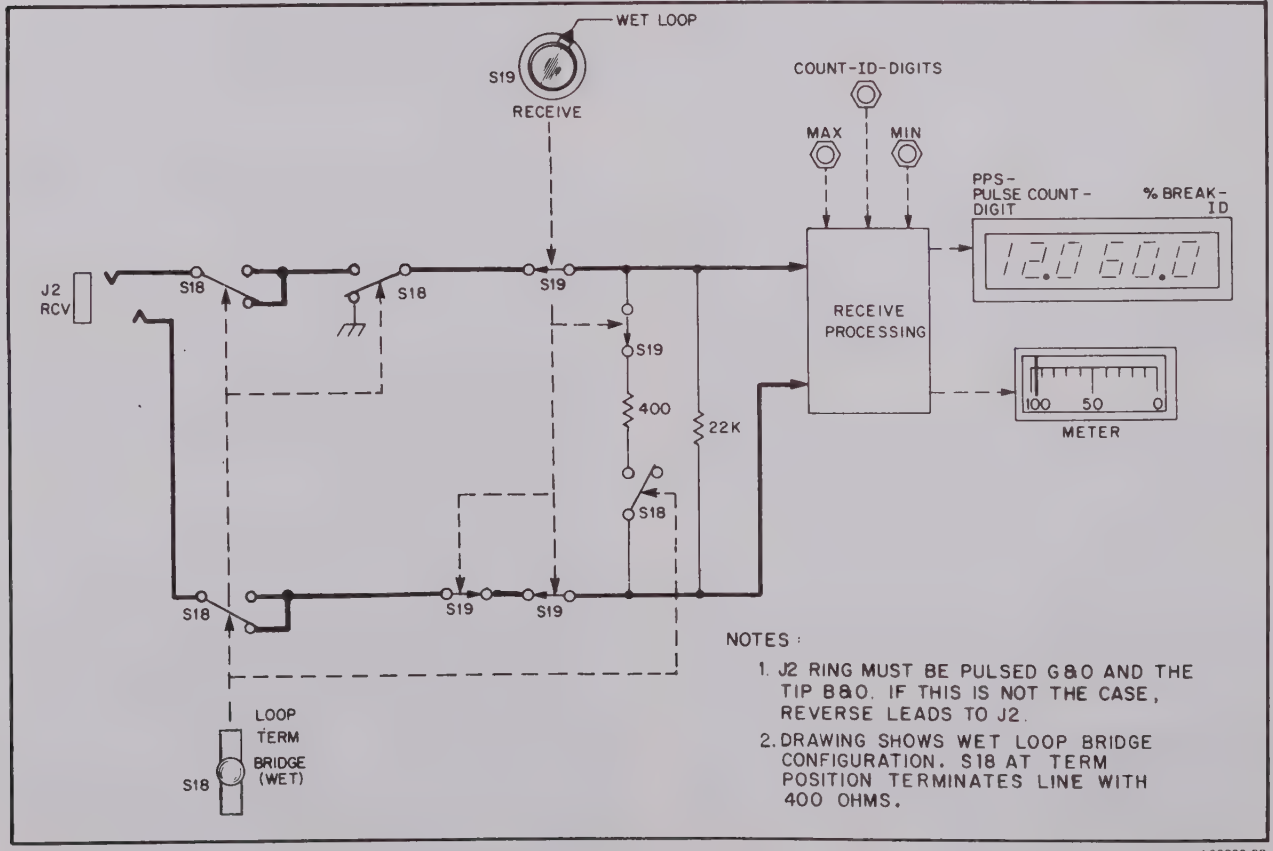

Figure 5—9. Receiving On Wet Loop (terminated or bridging)

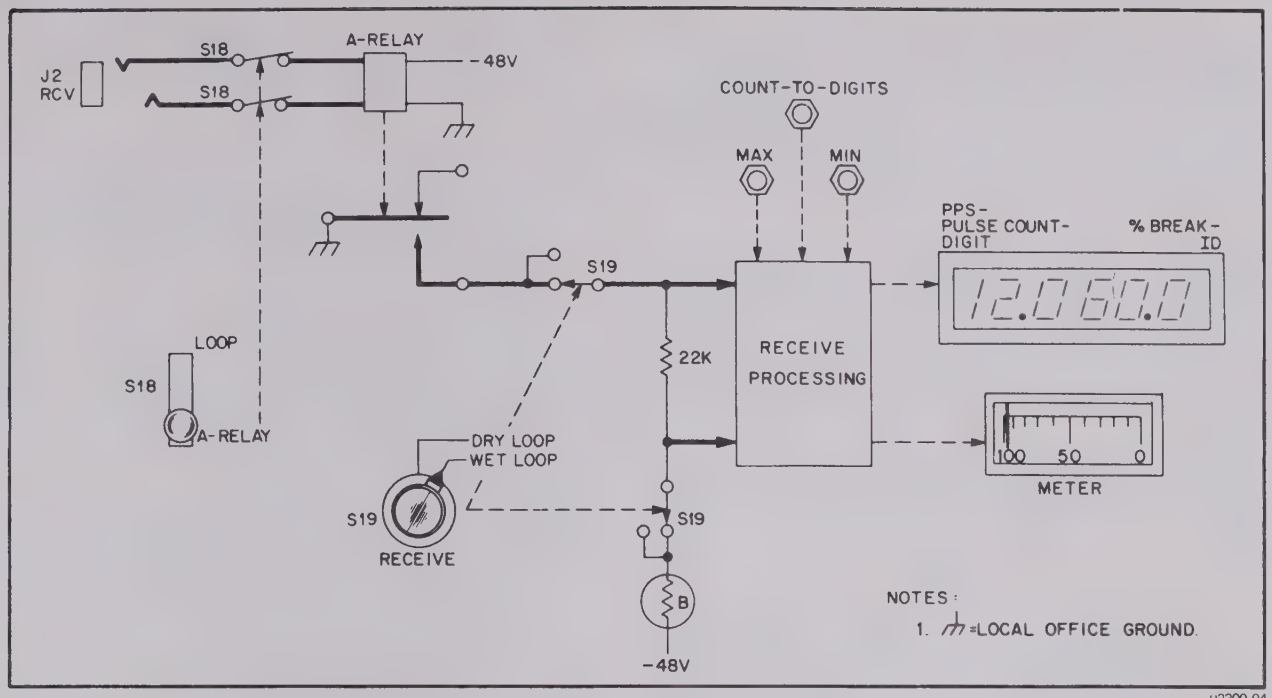

Figure 5—10. Receiving On Dry Or Wet Loop Through A-Relay

5.31 RECEIVING ON E LEAD FROM LINE

5.32 To receive E lead pulsing from the line direction, perform the following steps.

1. If the Model 1260A is to be used both as a sender and a receiver, follow the appropriate send procedure listed in Table 5—1 **first**. Then resume this procedure with step 3 below.

2. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; and then place POWER switch at ON position. Power indicator on switch should light.

3. Determine if a terminated or bridging measurement is required. A terminated measurement replaces the normal in-service E lead termination with an equivalent low impedance termination. A high impedance bridging measurement is made under in-service conditions.

4. If a terminated measurement is to be made on a circuit already removed from service, proceed directly to step 10. Otherwise, continue with step 5 below.

5. Set the E&M/LOOP switch to THRU & MON position.

6. Establish a monitoring connection with the E&M circuit to be tested via an office E&M jackfield (or similar method) as shown in Figure 5-1. To ensure service is not momentarily interrupted, connect to the 1260A's E&M LINE and DROP jacks first, and then connect to the jackfield using a WECO 338A (or equivalent) twin-plug.

7. If a terminated measurement is to be made on a line now in service, check idle/busy status as described in steps 8 and 9 below. If a bridging measurement is to be made under in-service conditions, proceed directly to step 11.

8. Observe the instrument's E&M indicator lamps. If the E lamp is extinguished, circuit is seized at far end (i.e. E lead is at ground potential). If the M lamp is extinguished, circuit is seized at near end (i.e. M lead is at battery potential). If both lamps are lighted, circuit is idle.

9. If the E&M circuit under test is found to be idle, it can be taken out of service for a terminated measurement. Proceed directly to step 11.

10. Using a suitable patch cord, connect the Model 1260A's E&M LINE jack to the line jack of an office E&M jackfield as shown in Figure 5—1. Connect the 1260A's E&M DROP jack to the office jackfield drop jack only if it is desired to busy out the near end of the circuit by sending an E lead off-hook signal (ground). If the office is not equipped with an E&M jackfield, use most convenient method to achieve required connections.

11. Set the RECEIVE mode switch to E I-II-III G&O position if ground and open E lead pulsing is to be measured. (This is normally the method of E lead pulsing employed by E&M Types I, II, III.) Set the RECEIVE mode switch to E (SF) G&B position if ground and battery E lead pulsing is to be measured.

12. If a bridging measurement is to be made, proceed directly to step 15. Otherwise, set the E&M/LOOP switch to either SEND-RCV position. This action removes the line from service and replaces the E lead's normal in-service termination with an equivalent low impedance termination. Continue with step 13.

13. If it is desired to busy out **either** end of the E&M circuit under test (via the M lead), set the SEND mode switch to M II B&O or M I-III B&G position.

NOTE

- ☐ If the instrument is presently configured to send either loop or SF signaling, the busy-out capability is not available. (Hence omit step 13 above.)

- ☐ If the instrument is presently configured to send E lead pulsing, the circuit can be busied out in either direction according to the procedure of paragraph 5.14.

- ☐ To send a reverse busy signal in the drop direction, the circuit under test must be patched from the drop side to the 1260A's E&M DROP jack as described in steps 6 and 10.

14. Step 13 above sends an E lead off-hook signal (ground) in the drop direction to busy out the circuit at the near end. To busy out the circuit at the far end via an M lead off-hook signal (battery), place the ON HOOK/OFF HK + DIAL/CONT switch at OFF HK + DIAL position.

15. The instrument is now properly configured for an E lead pulsing measurement as shown in Figures 5—11 and 5—12. Figure 5—11 shows the terminated configuration while Figure 5—12 shows the bridging configuration.

16. Clear the display (even if no digits are being displayed) by engaging both the MIN and MAX pushbuttons simultaneously.

17. If necessary, initiate the sending of the pulse signaling to be measured. If the 1260A is to be the source of the test signal, perform step 18 below. Otherwise, proceed directly to step 19.

18. To send the required supervision/pulsing via the 1260A, perform the following actions.

NOTE

This step assumes the instrument has been properly configured for sending supervision/pulsing according to the appropriate send procedure listed in Table 5—1.

- ☐ To send a steady off-hook signal, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

- ☐ To send digits in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

- ☐ To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

- ☐ To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. This action initiates the sending of a continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

19. Pulsing measurement results can now be obtained from the 1260A. If necessary, refer to paragraph 4.45 for assistance in reading the digital readout. Also, the analog panel meter provides an indication of instantaneous percent break and on-hook/off-hook status on the line under test. The meter is especially useful for observation of short-term variations in received percent break.

The E lead monitor lamp should show status of the E lead under test. The indicator flashes when E lead pulsing

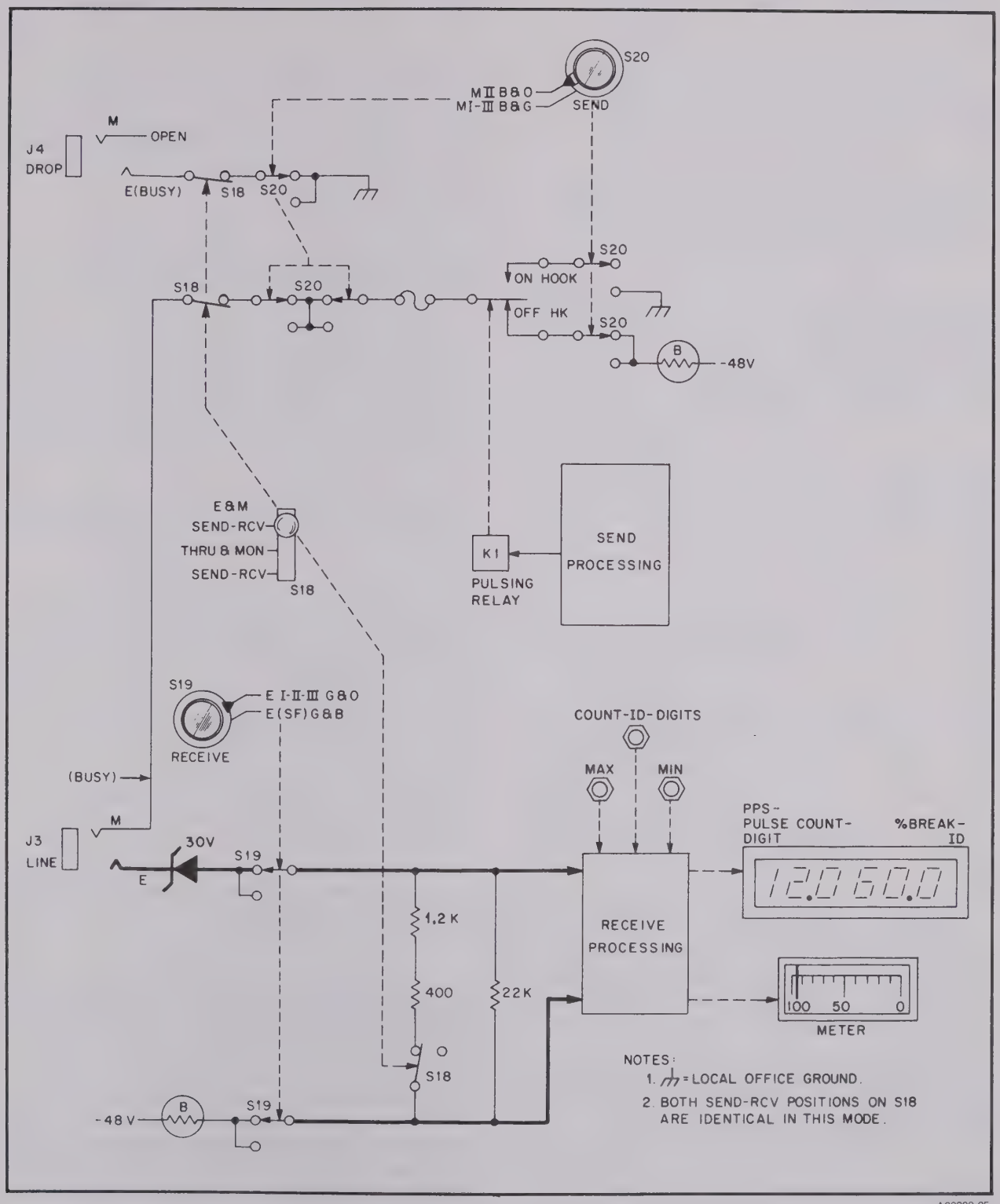

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Figure 5—11. Receiving On E Lead From The Line (terminated)

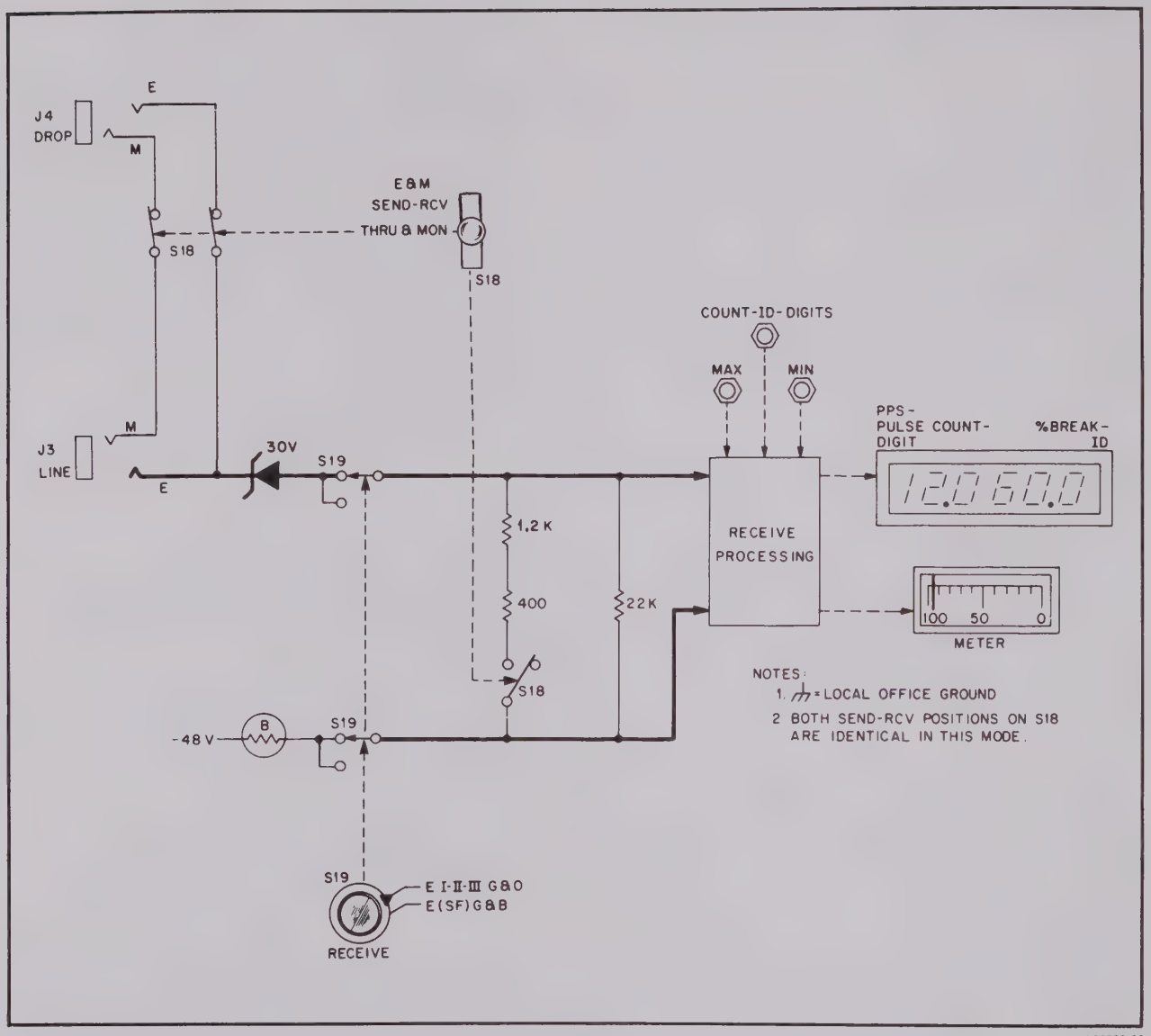

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Figure 5—12. Receiving On E Lead From The Line (bridging)

is received, lights during steady on-hook periods (absence of E lead ground), and darkens during steady off-hook periods (presence of E lead ground).

20. If desired, use the METER ADJ control to set the analog meter to agree with the digital readout.

5.33 RECEIVING ON M LEAD FROM DROP

5.34 To receive M lead pulsing from the drop direction, perform the following steps.

1. If the Model 1260A is to be used both as a sender and a receiver, follow the appropriate send procedure listed in Table 5—1 **first**. Then resume this procedure with step 3 below.

2. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; and then place POWER switch at ON position. Power indicator on switch should light.

3. Determine if a terminated or bridging measurement is required. A terminated measurement replaces the normal in-service M lead termination with an equivalent low impedance termination. A high impedance bridging measurement is made under in-service conditions.

4. If a terminated measurement is to be made on a circuit already removed from service, proceed directly to step 10. Otherwise, continue with step 5 below.

5. Set the E&M/LOOP switch to THRU & MON position.

6. Establish a monitoring connection with the E&M circuit to be tested via an office E&M jackfield (or similar method) as shown in Figure 5—1. To ensure service is not momentarily interrupted, connect to the 1260A's E&M LINE and DROP jacks first, and then connect to the jackfield using a WECO 338A (or equivalent) twin-plug.

7. If a terminated measurement is to be made on a line now in service, check idle/busy status as described in steps 8 and 9 below. If a bridging measurement is to be made under in-service conditions, proceed directly to step 11.

8. Observe the instrument's E&M indicator lamps. If the E lamp is extinguished, circuit is seized at far end (i.e. E lead is at ground potential). If the M lamp is extinguished, circuit is seized at near end (i.e. M lead is at battery potential). If both lamps are lighted, circuit is idle.

9. If the E&M circuit under test is found to be idle, it can be taken out of service for a terminated measurement. Proceed directly to step 11.

10. Using a suitable patch cord, connect the Model 1260A's E&M DROP jack to the drop jack of an office E&M jackfield as shown in Figure 5—1. Connect the 1260A's E&M LINE jack to the office jackfield line jack only if it is desired to busy out the far end of the circuit by sending an M lead off-hook signal (battery). If the office is not equipped with an E&M jackfield, use most convenient method to achieve required connections.

11. Set the RECEIVE mode switch to M II B&O position if battery and open M lead pulsing is to be measured. (This is normally the method of M lead pulsing employed by E&M Type II signaling.) Set the RECEIVE mode switch to M I-III B&G position if battery and ground pulsing is to be measured. (This is normally the method of M lead pulsing employed by E&M Types I and III.)

12. If a bridging measurement is to be made, proceed directly to step 15. Otherwise, set the E&M/LOOP switch to either SEND-RCV position. This action removes the line from service and replaces the M-lead's normal in-service termination with an equivalent low impedance termination. Continue with step 13.

13. If it is desired to busy out **either** end of the circuit under test (via the E lead), set the SEND mode switch to E I-II-III G&O or E (SF) G&B position.

NOTE

☐ If the instrument is presently configured to send either loop or SF signaling, the busy-out capability is not available. (Hence omit step 13 above.)

☐ If the instrument is presently configured to send M lead pulsing, the circuit can be busied out in either direction according to the procedure of paragraph 5.16.

☐ To send a reverse busy signal in the line direction, the circuit under test must be patched from the line side to the 1260A's E&M LINE jack as described in steps 6 and 10.

14. Step 13 above sends an M lead off-hook signal (battery) in the line direction to busy out the circuit at the far end. To busy out the circuit at the near end via an E lead off-hook signal (ground), place the ON HOOK/OFF HK + DIAL/CONT switch at OFF HK + DIAL position.

15. The instrument is now properly configured for an M lead pulsing measurement as shown in Figures 5—13 and 5—14. Figure 5—13 shows the terminated configuration while Figure 5—14 shows the bridging configuration.

16. Clear the display (even if no digits are being displayed) by engaging both the MIN and MAX pushbuttons simultaneously.

17. If necessary, initiate the sending of the pulse signaling to be measured. If the 1260A is to be the source of the test signal, perform step 18 below. Otherwise, proceed directly to step 19.

18. To send the required supervision/pulsing via the 1260A, perform the following actions.

NOTE

This step assumes the instrument has been properly configured for sending supervision/pulsing according to the appropriate send procedure listed in Table 5—1.

☐ To send a steady off-hook signal, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

☐ To send digits in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial

mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

☐ To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

☐ To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. This action initiates the sending of a continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

19. Pulsing measurement results can now be obtained from the 1260A. If necessary, refer to paragraph 4.45 for assistance in reading the digital readout. Also, the analog panel meter provides an indication of instantaneous percent break and on-hook/off-hook status on the line under test. The meter is especially useful for observation of short-term variations in received percent break.

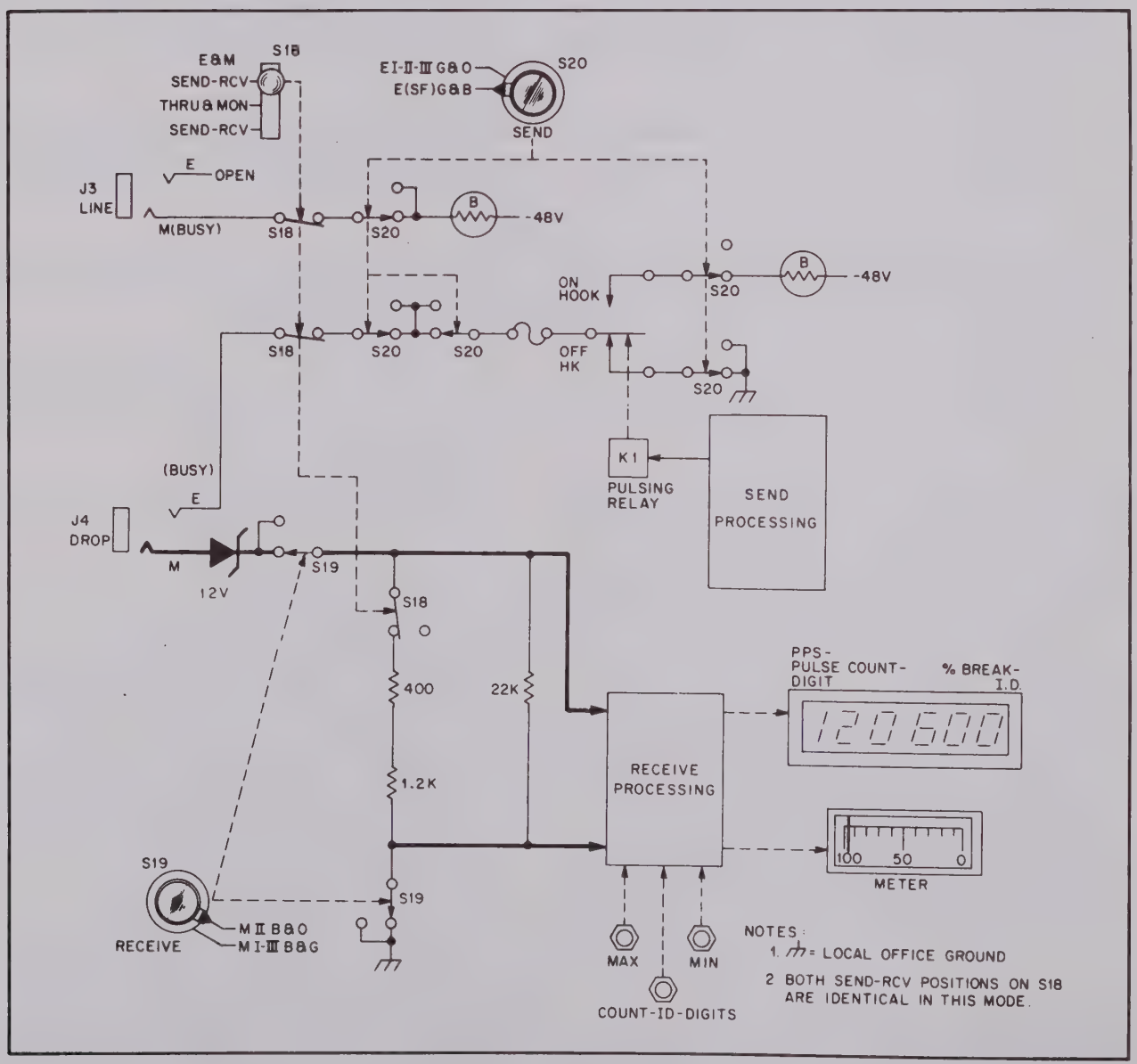

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Figure 5—13. Receiving On M Lead From The Drop (terminated)

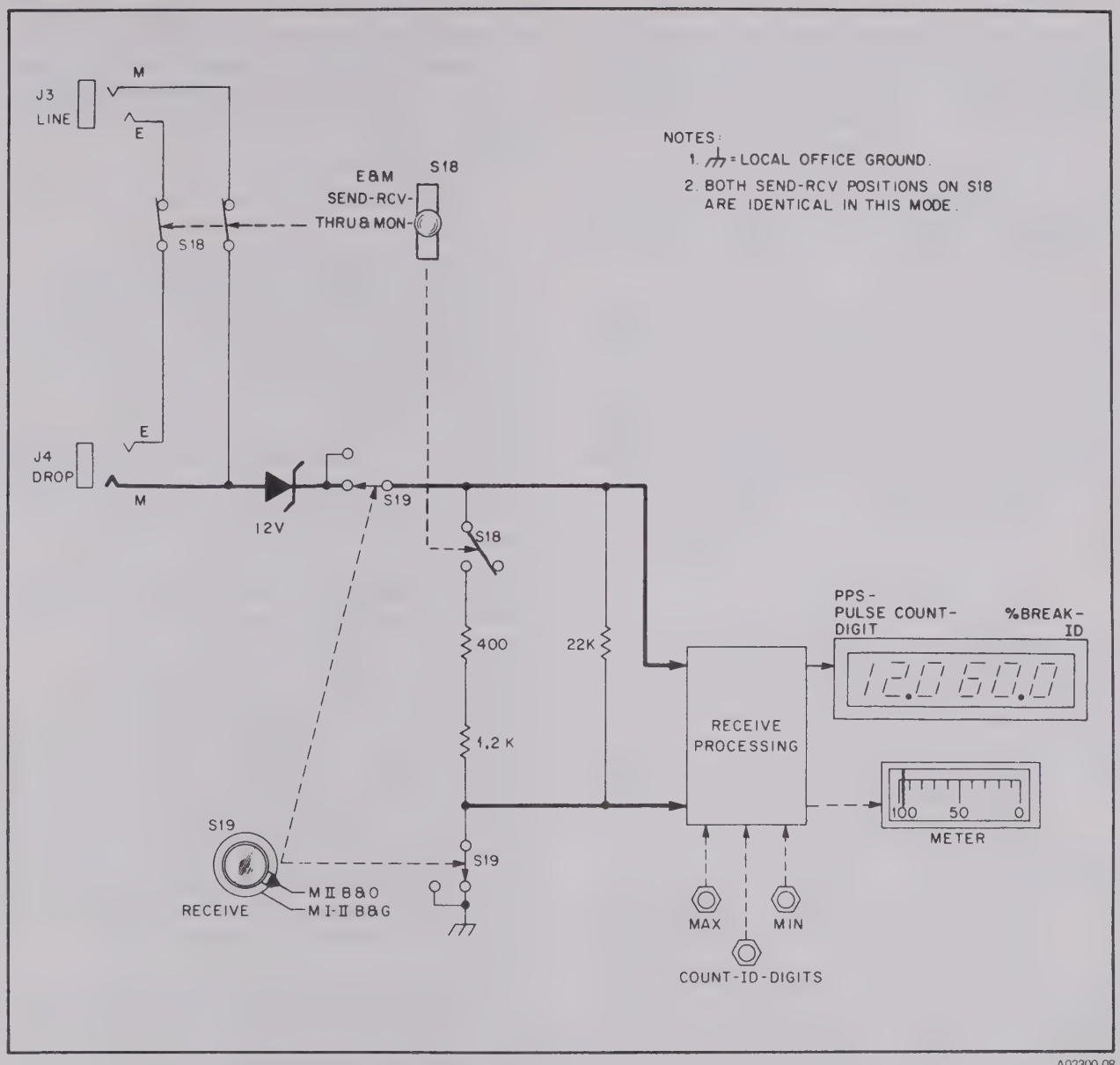

Figure 5—14. Receiving On M Lead From The Drop (bridging)

The M lead monitor lamp should show status of the M lead under test. The indicator flashes when M lead pulsing is received, lights during steady on-hook periods (absence of battery potential on M lead), and darkens during steady off-hook periods (presence of battery potential on M lead).

20. If desired, use the METER ADJ control to set the analog meter to agree with the digital readout.

5.35 RECEIVING SF SIGNALING

5.36 To receive SF signaling from either line or drop, perform the following steps.

NOTE

For SF signaling applications, the Model 1260A must be equipped with the optional SF module.

1. If the Model 1260A is to be used both as a sender and a receiver, follow the appropriate send procedure listed in Table 5—1 **first**. Then resume this procedure with step 3 below.

2. If not done previously, power the Model 1260A by following the recommendations of paragraph 4.6; and then place POWER switch at ON position. Power indicator on switch should light.

3. Determine if a terminated or bridging measurement is required. A terminated measurement replaces a line's normal in-service termination with the SF module's 600 ohm termination. A high impedance bridging measurement is made under in-service conditions.

4. If a terminated measurement is to be made on a circuit now in service, check idle/busy status according to steps 5 through 12 below. Otherwise, proceed directly to step 13.

5. On the SF module, set the SEND-RCV LINE/MON/SEND-RCV DROP switch to MON position.

6. Using a suitable patch cord, connect the module's SF RCV jack to a convenient monitor point on the send leg (i.e. the outgoing pair to the distant office) of the circuit under test. Use of an office monitor jack similar to those shown on Figure 5—2 is recommended.

NOTE

If office line and drop jacks similar to those shown in Figure 5—2 are available but a monitor jack is not, the line (either pair) can be monitored without disturbing service as follows:

- ☐ Set the SF module's SEND-RCV LINE/MON/SEND-RCV DROP switch to MON position. This action thru-connects the module's SF SEND and SF RCV jacks as shown in Figure 5—7.

- ☐ Patch the SF SEND jack to one side (line or drop) of the pair to be monitored and patch the SF RCV jack to the other side. To ensure service is not momentarily interrupted, connect to both SF module jacks first and then connect to the office line and drop jacks using a WECO 338A (or equivalent) twin-plug.

7. Observe the SF module's CKT IDLE lamp. If the lamp is lighted (indicating the presence of continuous SF tone), the SF circuit is idle at the near end.

8. Disconnect the module's SF RCV jack from the send leg of the circuit under test and reconnect to a monitor point on the receive leg.

9. If the CKT IDLE lamp is now lit, the SF circuit is idle at the far end.

10. If the SF circuit under test is found to be idle at both ends, it can be taken out of service for a terminated measurement as described below.

11. In some applications, it may be desirable to busy out the line (via a steady off-hook signal) in the direction opposite to the direction of the measurement. This can be accomplished by following the procedure of paragraph 5.18.

12. Remove patch cord from the monitor point on the receive leg of the line under test.

13. If a terminated measurement is to be made, set the module's SEND-RCV LINE/MON/SEND-RCV DROP switch to SEND-RCV position corresponding to the direction of the test. This action selects a 600-ohm termination and the appropriate receive sensitivity as shown in Table 4—6.

If a bridging measurement is to be made, set the SEND-RCV LINE/MON/SEND-RCV DROP switch to MON position. This action selects a high bridging impedance and disables the SF sender as shown on Figure 5—7.

14. If a bridging measurement is to be made, proceed directly to step 17. Continue with step 15 for a terminated measurement.

15. If SF signaling is to be received from the line direction, patch the module's SF RCV jack to the receive leg (i.e. the incoming pair from the distant office) of the circuit under test. If SF signaling to to be received from the drop direction, patch the SF RCV jack to the send leg of the circuit under test. Use of an office line or drop jack (as appropriate) similar to those shown on Figure 5—2 is recommended. Such a connection will break the line and remove the normal in-service termination.

16. After completing step 15 above proceed directly to step 18.

17. Using a suitable patch cord, connect the module's SF RCV jack to a convenient monitor point on either the send leg (i.e. the outgoing pair to the distant office) or the receive leg of the line under test; as required by the direction of the test. Use of an office monitor jack similar to those shown on Figure 5—2 is recommended. (See note following step 6 for an alternate means to bridge the line.) Such a connection will not interrupt service on the line.

18. Set the Model 1260A's RECEIVE mode switch to E (SF) G&B position. The instrument is now properly configured to measure SF pulsing as shown in Figure 5—7.

19. Clear the display (even if no digits are being displayed) by engaging both the MIN and MAX pushbuttons simultaneously.

20. If necessary, initiate the sending of the pulse signaling to be measured. If the 1260A is to be the source of the test signal, perform step 21 below. Otherwise, proceed directly to step 22.

21. To send the required supervision/pulsing via the 1260A, perform the following actions.

NOTE

This step assumes the instrument has been properly configured for sending supervision/pulsing according to the appropriate send procedure listed in Table 5—1.

☐ To send a steady off-hook signal, set the ON HOOK/OFF HK + DIAL/CONT switch to OFF HK + DIAL. The SEND lamp goes out. (The ON HOOK/OFF HK + DIAL/CONT switch can be returned to ON HOOK at any time to send a continuous on-hook signal.)

☐ To send digits in the immediate-dial mode, enter the desired digits via the keypad while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. The entered digits are immediately outpulsed as indicated by the flashing SEND lamp. When dialing in the immediate-dial mode, each digit is sent at the pulsing speed and percent break selected on the SEND thumbwheels. The interdigit time will be as selected only if each digit is entered prior to completion of outpulsing of preceding digit.

☐ To dial a previously entered number from memory, momentarily press the keypad's # button while the ON HOOK/OFF HK + DIAL/CONT switch is at OFF HK + DIAL position. This action initiates the dialing of the stored number as indicated by the flashing SEND lamp. Digits dialed from memory are always sent at the pulsing speed, percent break, and interdigit time selected on the SEND thumbwheels.

☐ To send a continuous stream of pulses, set the ON HOOK/OFF HK + DIAL/CONT switch to CONT. This action initiates the sending of a continuous stream of pulses as indicated by the flashing SEND lamp. The pulses are sent at the pulsing speed and percent break selected on the SEND thumbwheels.

22. The SF module should now be receiving SF signaling. The module's CKT IDLE lamp extinguishes during a steady off-hook period (absence of SF tone), lights during a steady on-hook period (presence of continuous SF tone), and flashes when SF pulsing is received.

23. Pulsing measurement results can now be obtained from the 1260A. If necessary, refer to paragraph 4.45 for assistance in reading the digital readout. Also, the analog panel meter provides an indication of instantaneous percent break and on-hook/off-hook status on the line under test. The meter is especially useful for observation of short-term variations in received percent break.

24. If desired, use the METER ADJ control to set the analog meter to agree with the digital readout.

5.37 COMBINED SEND/RECEIVE TESTING

5.38 Since the Model 1260A's send section is completely independent of its receive section, any send mode can be combined with any receive mode to achieve simultaneous send and receive testing. Mixed operating modes are extremely useful for input-to-output testing of signaling repeaters, translators, and converters.

5.39 Figures 5—15 through 5—25 show the Model 1260A configured for a number of typical send/receive applications. These drawings do not however, cover all possible send/receive operating modes.

5.40 To perform any combined send/receive test refer to the application guide of Table 5—1 for the appropriate send and receive procedures. Follow the steps for the selected send procedure first, and then perform the selected receive procedure. For convenience, Figures 5—15 through 5—25 give paragraph numbers for applicable send and receive procedures.

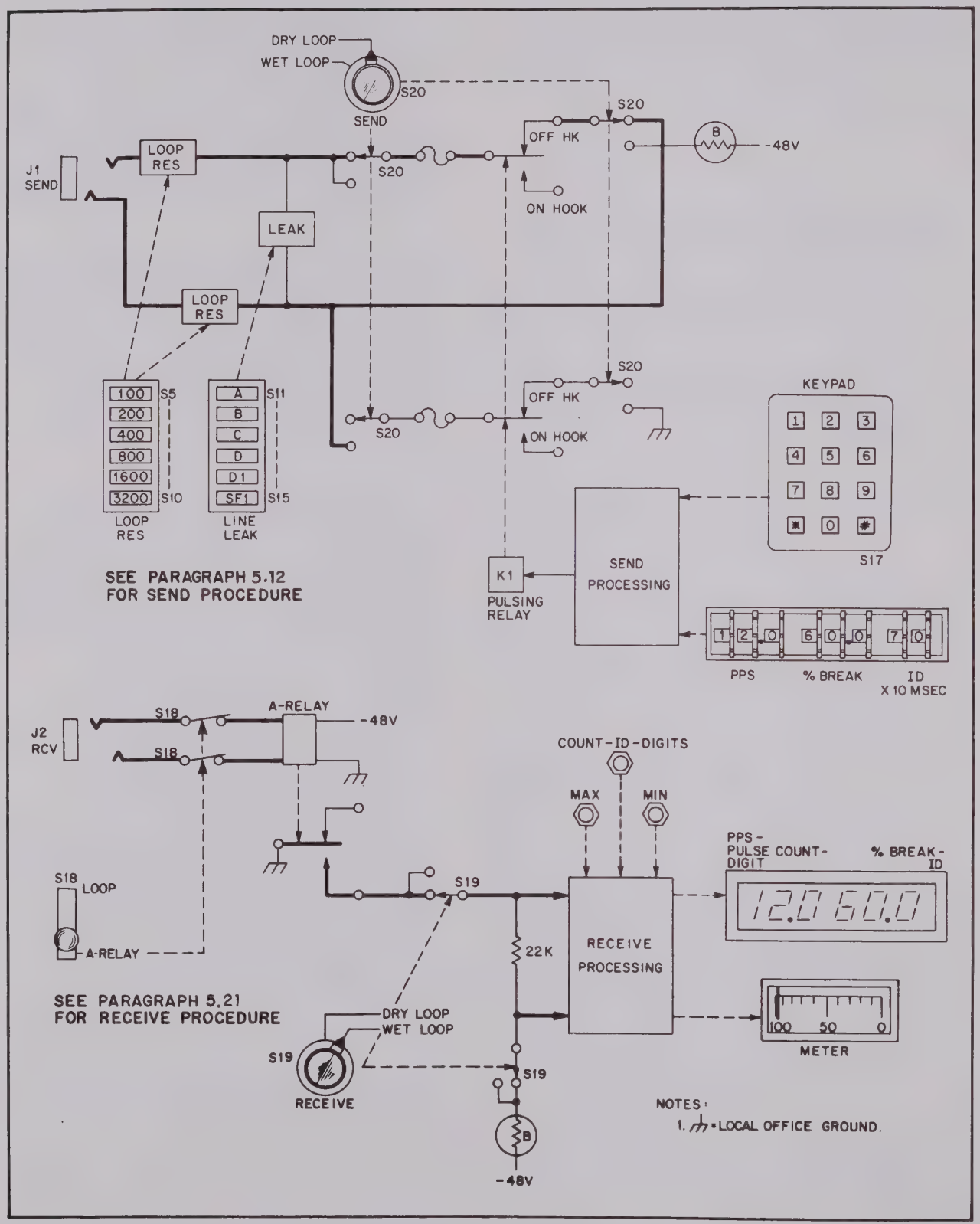

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Figure 5—15. Sending On Loop While Receiving On Loop Through A-Relay.

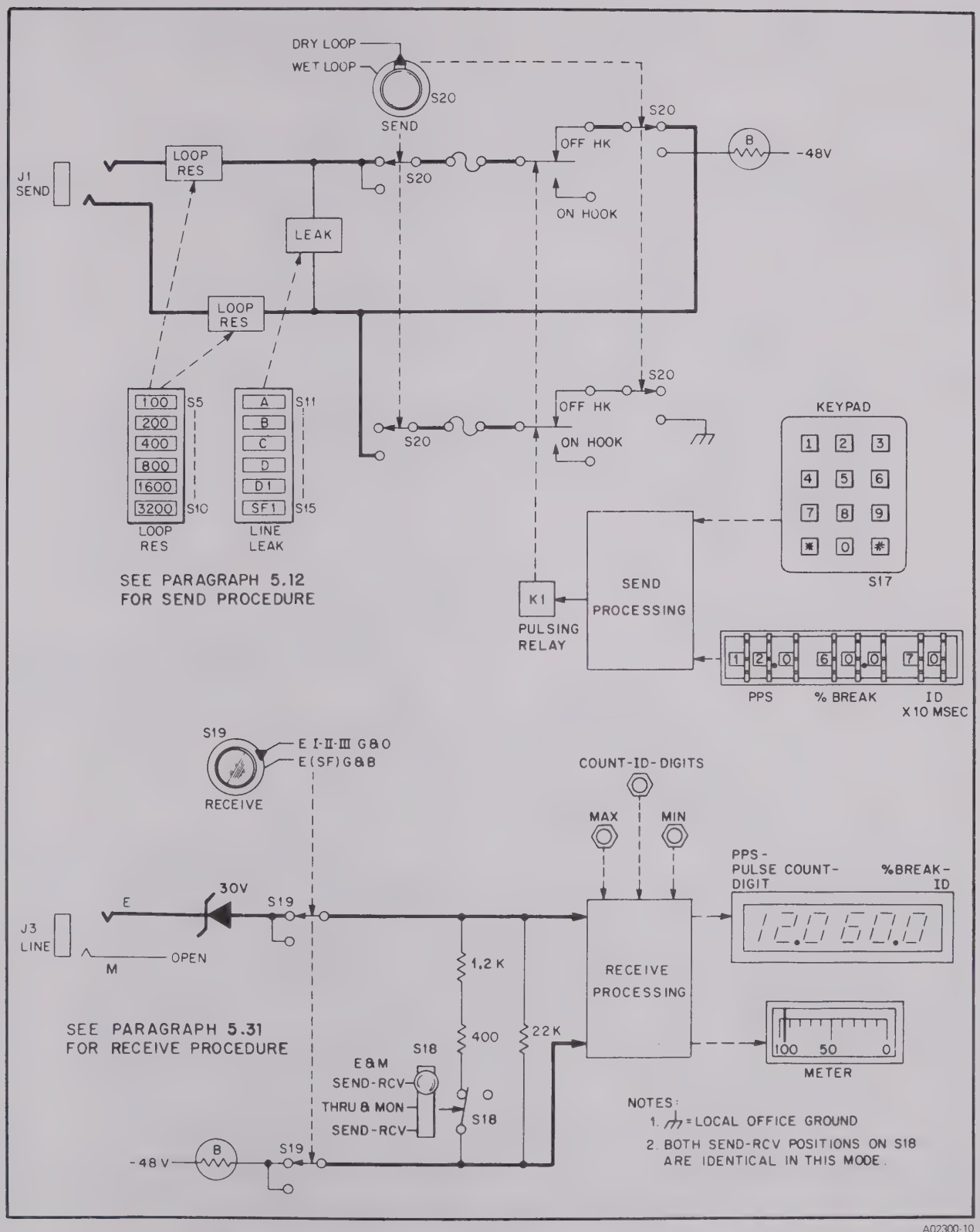

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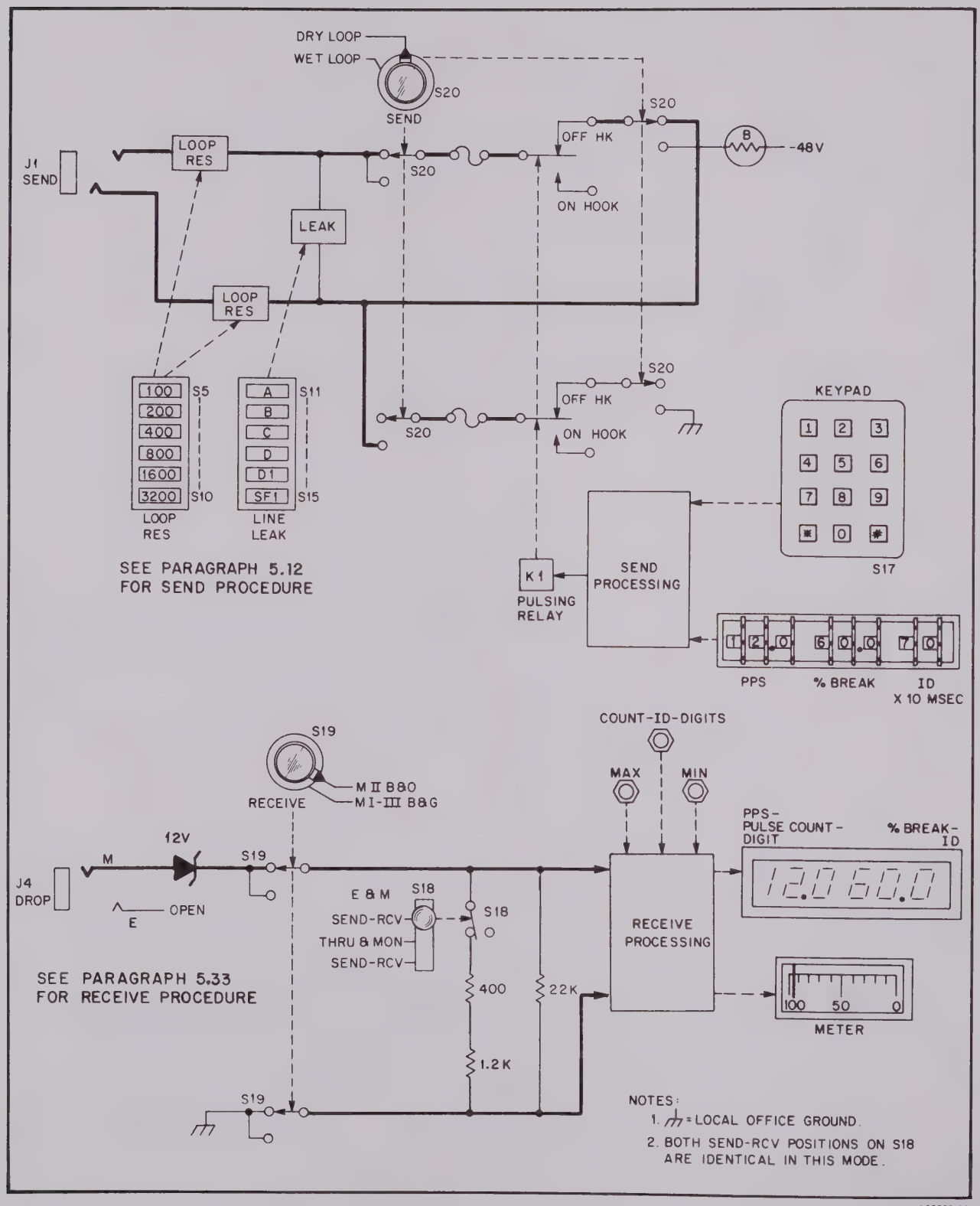
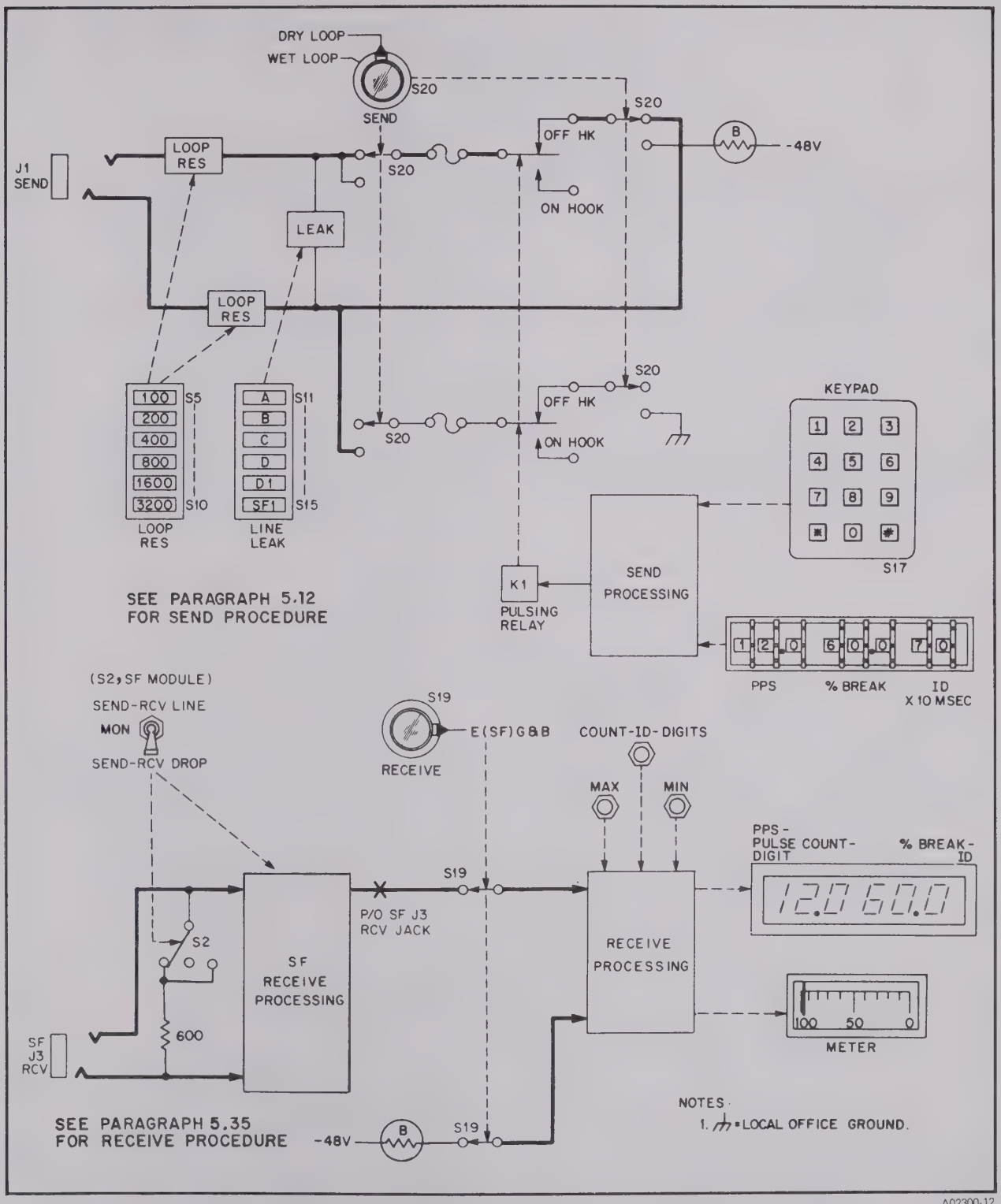
Figure 5—16. Sending On Loop While Receiving On E Lead



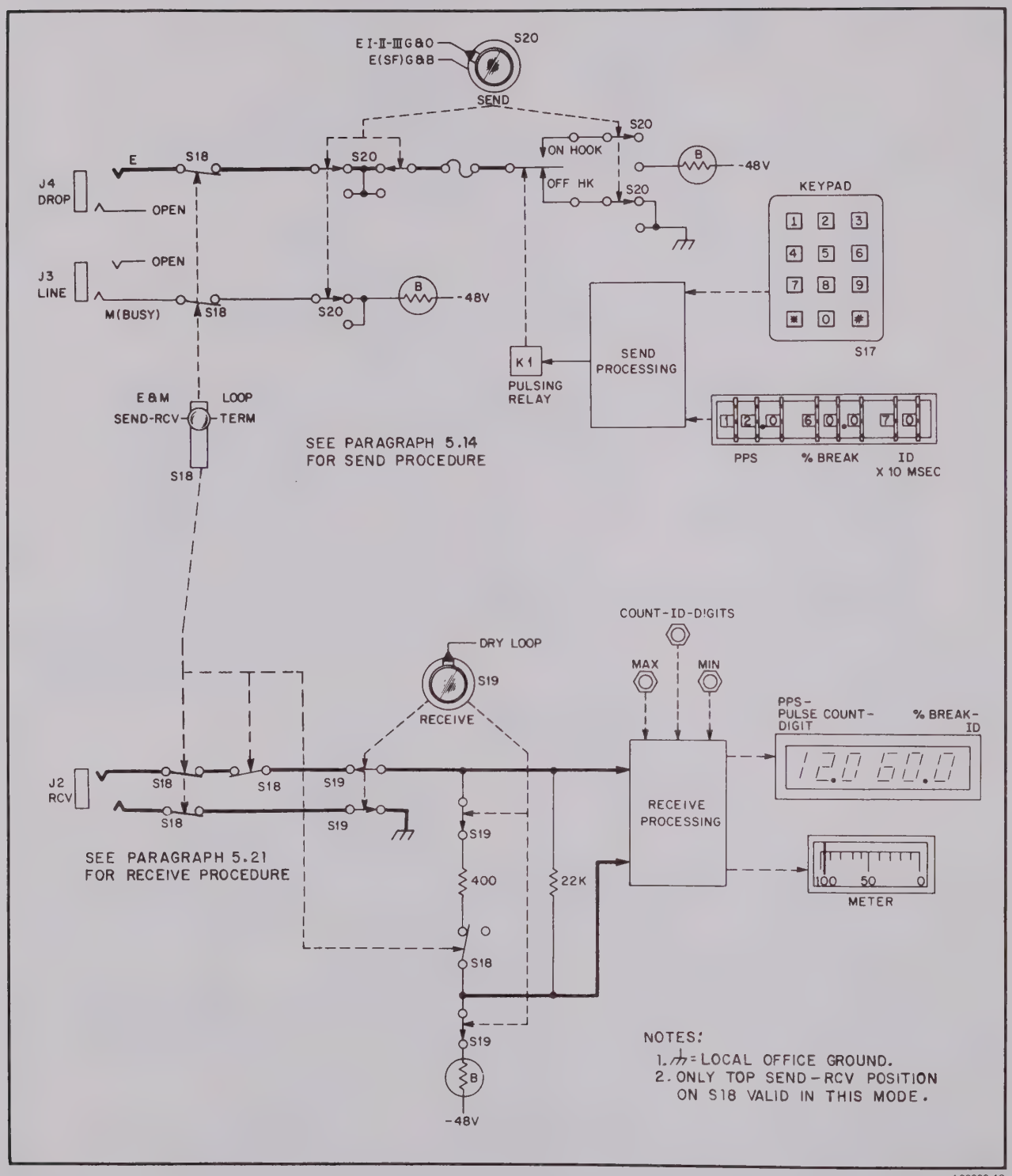
A02300-11

Figure 5—17. Sending On Loop While Receiving On M Lead



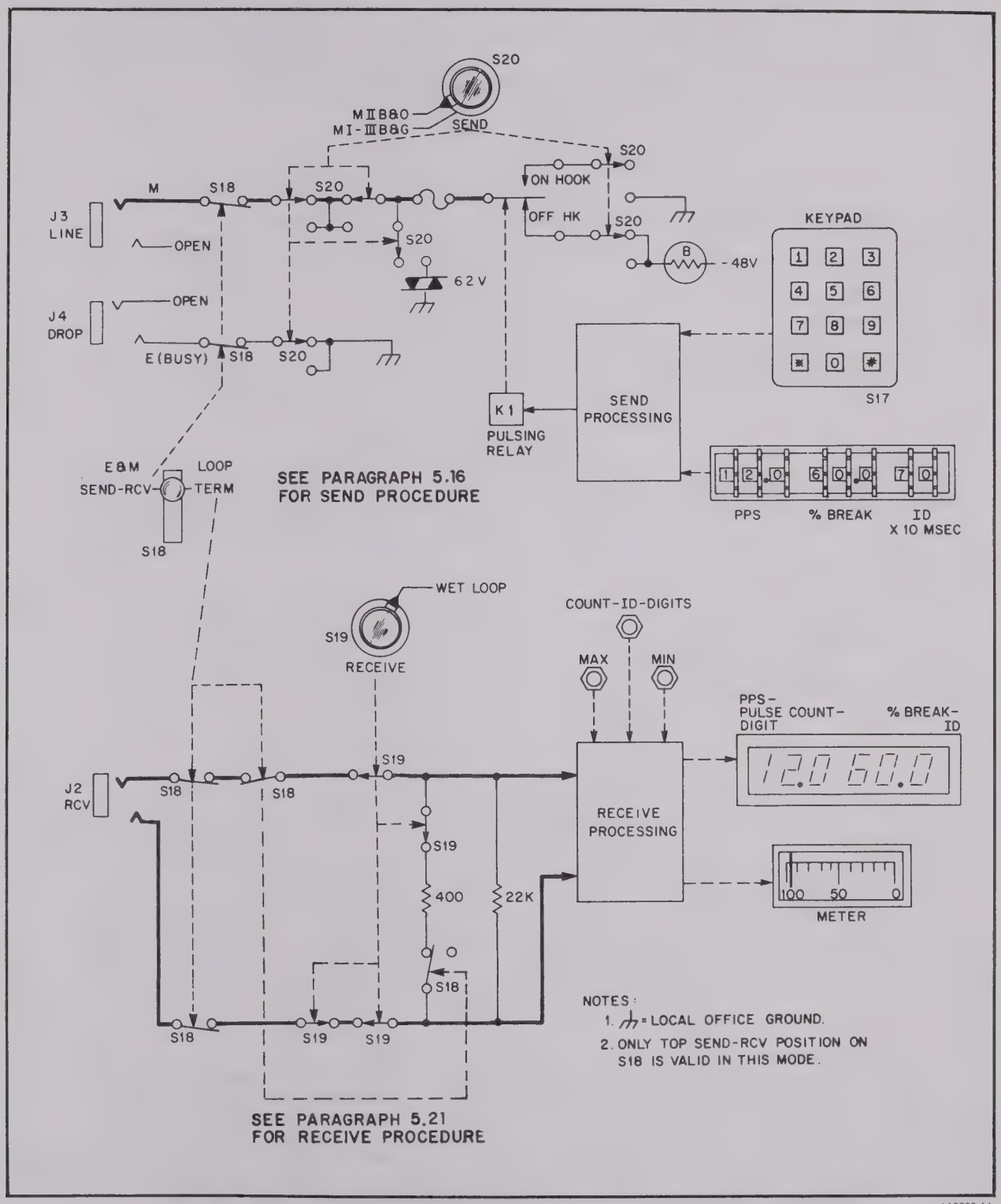
A02300-12

Figure 5—18. Sending On Loop While Receiving SF



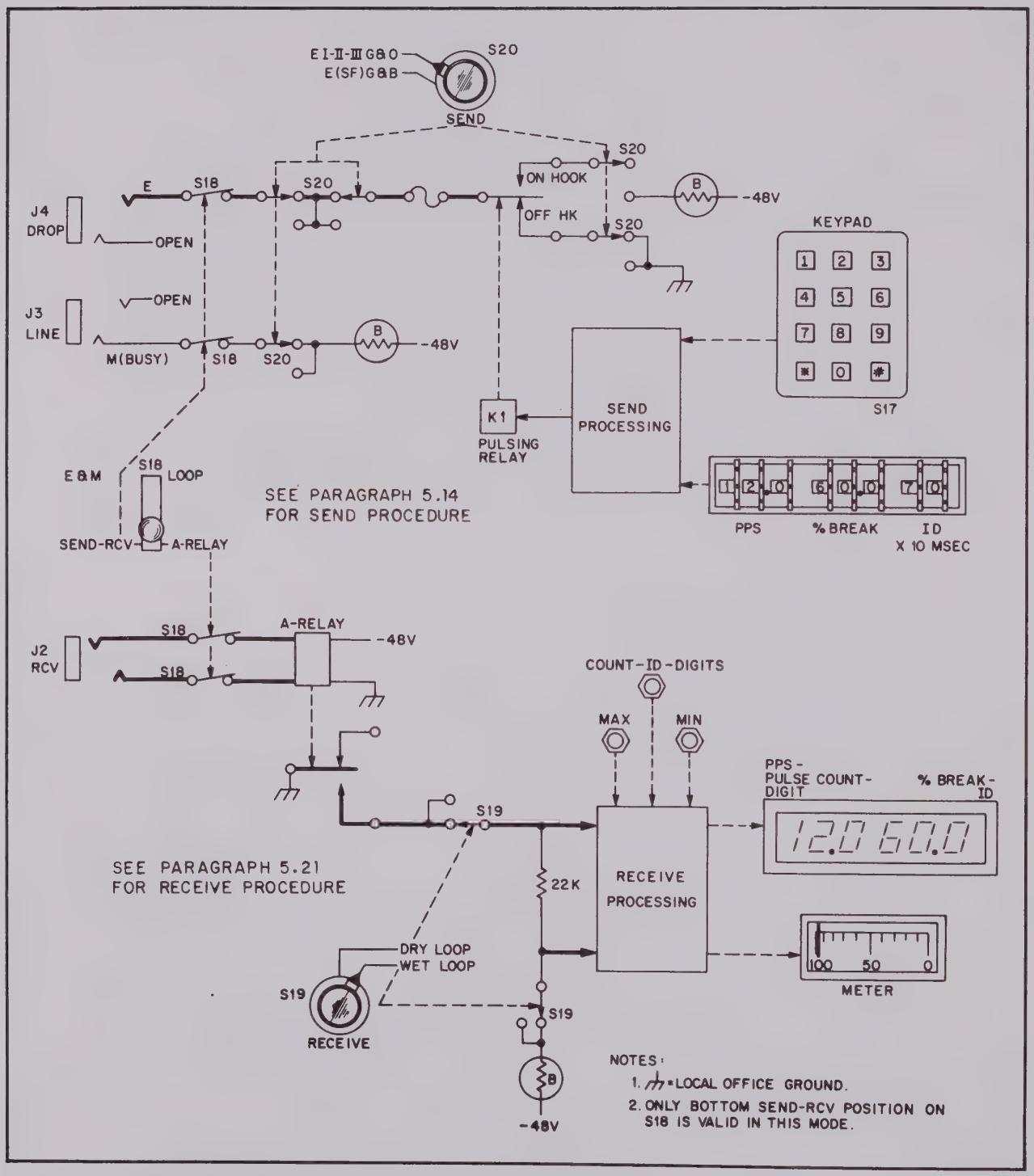
A02300-13

Figure 5—19. Sending On E Lead While Receiving On Dry Loop



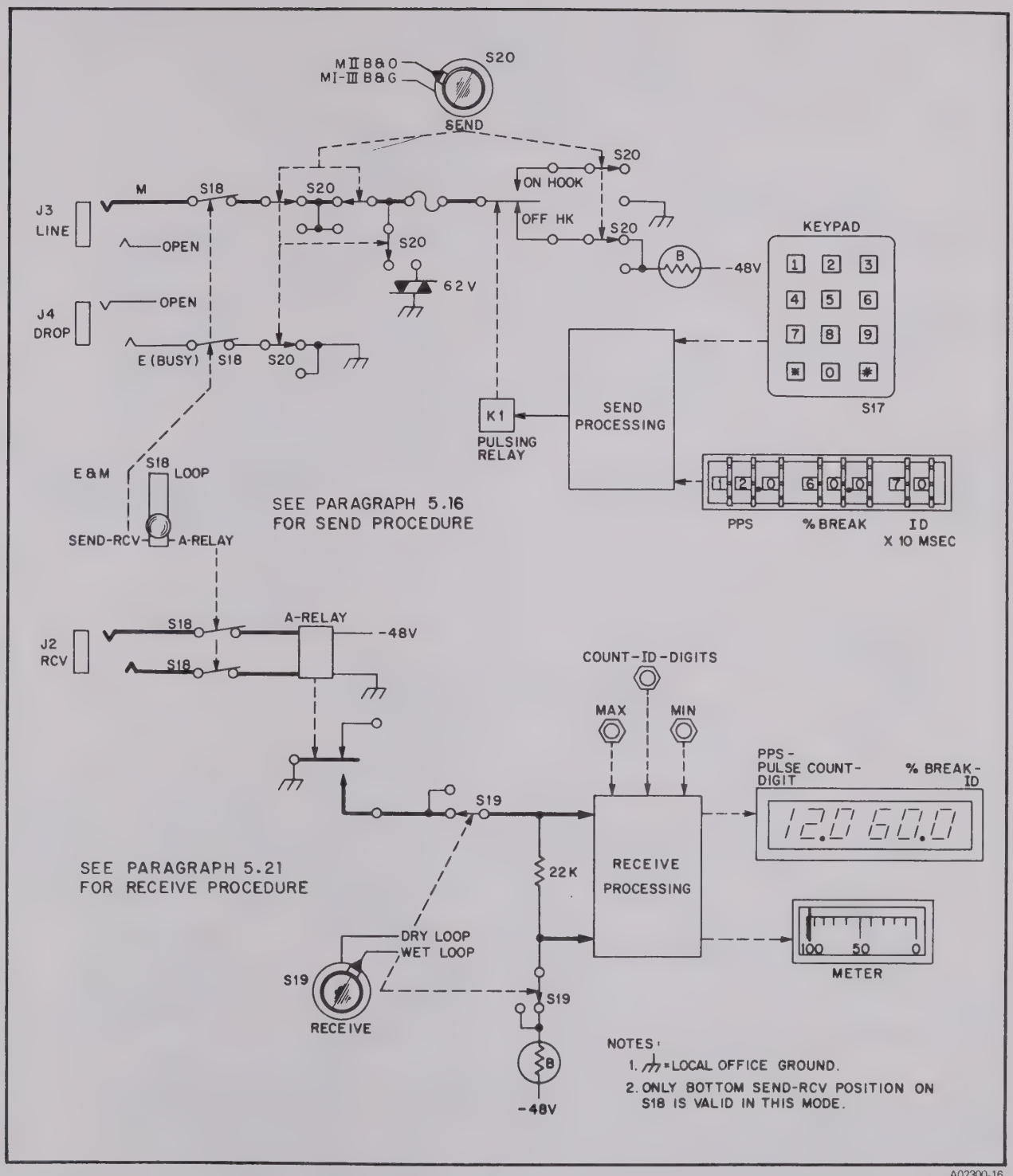
AG2300-14

Figure 5—20. Sending On M Lead While Receiving On Wet Loop



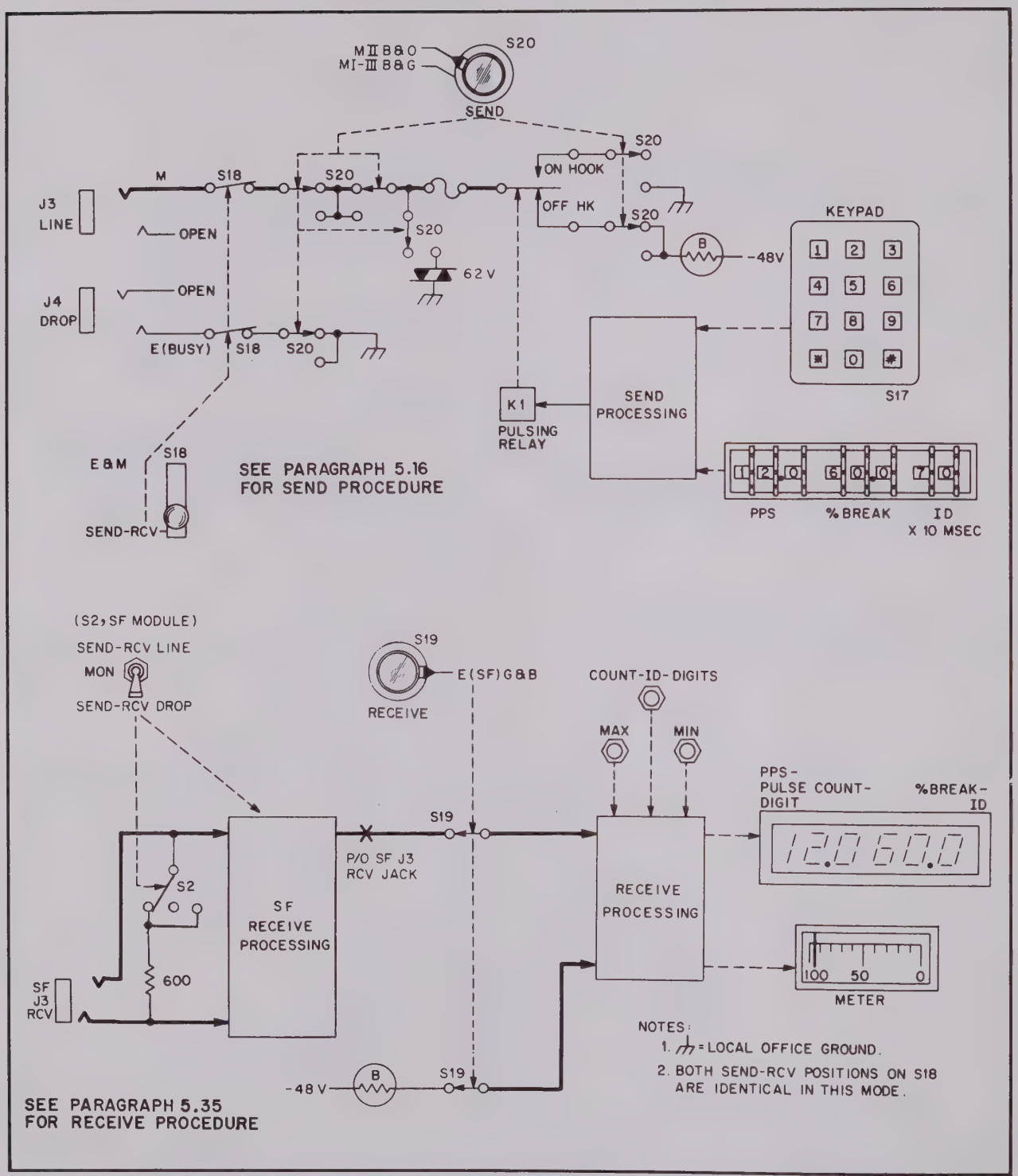
A02300-15

Figure 5—21. Sending On E Lead While Receiving On Loop Through A-Relay



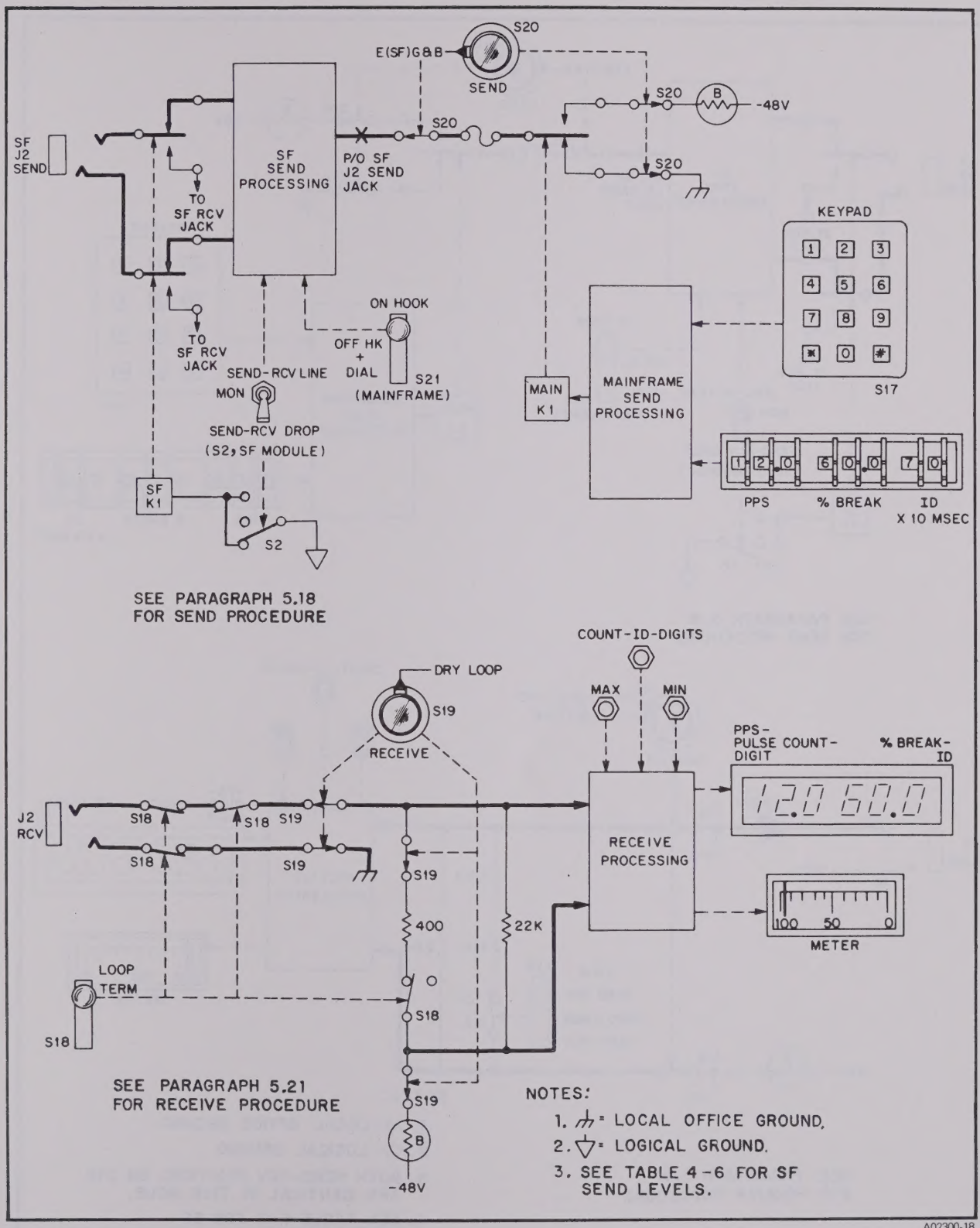
A02300-16

Figure 5—22. Sending On M Lead While Receiving On Loop Through A-Relay



A02300-17

Figure 5—23. Sending On M Lead While Receiving SF



A02300-18

Figure 5—24. Sending SF While Receiving On Dry Loop

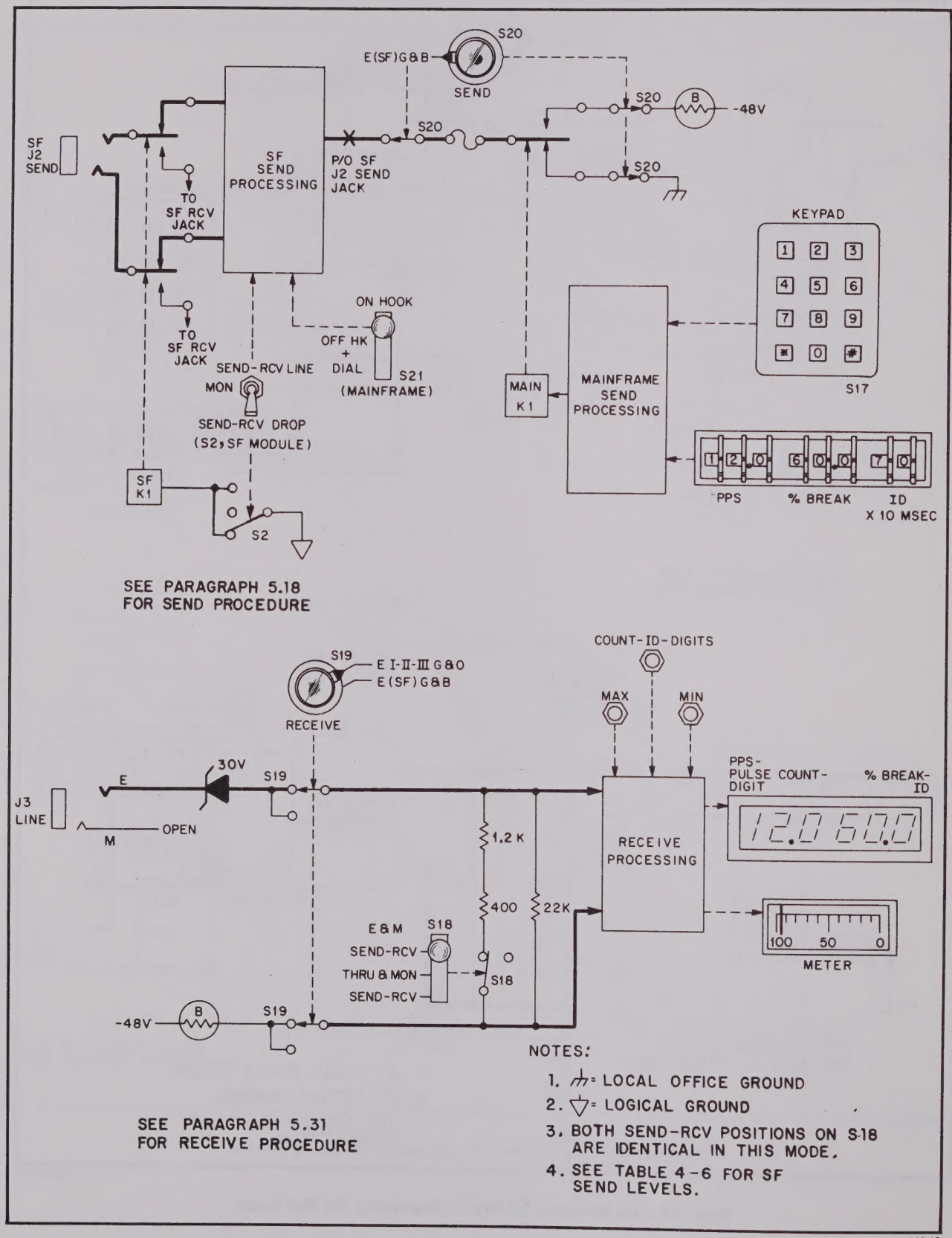


Figure 5—25. Sending SF While Receiving On E Lead

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